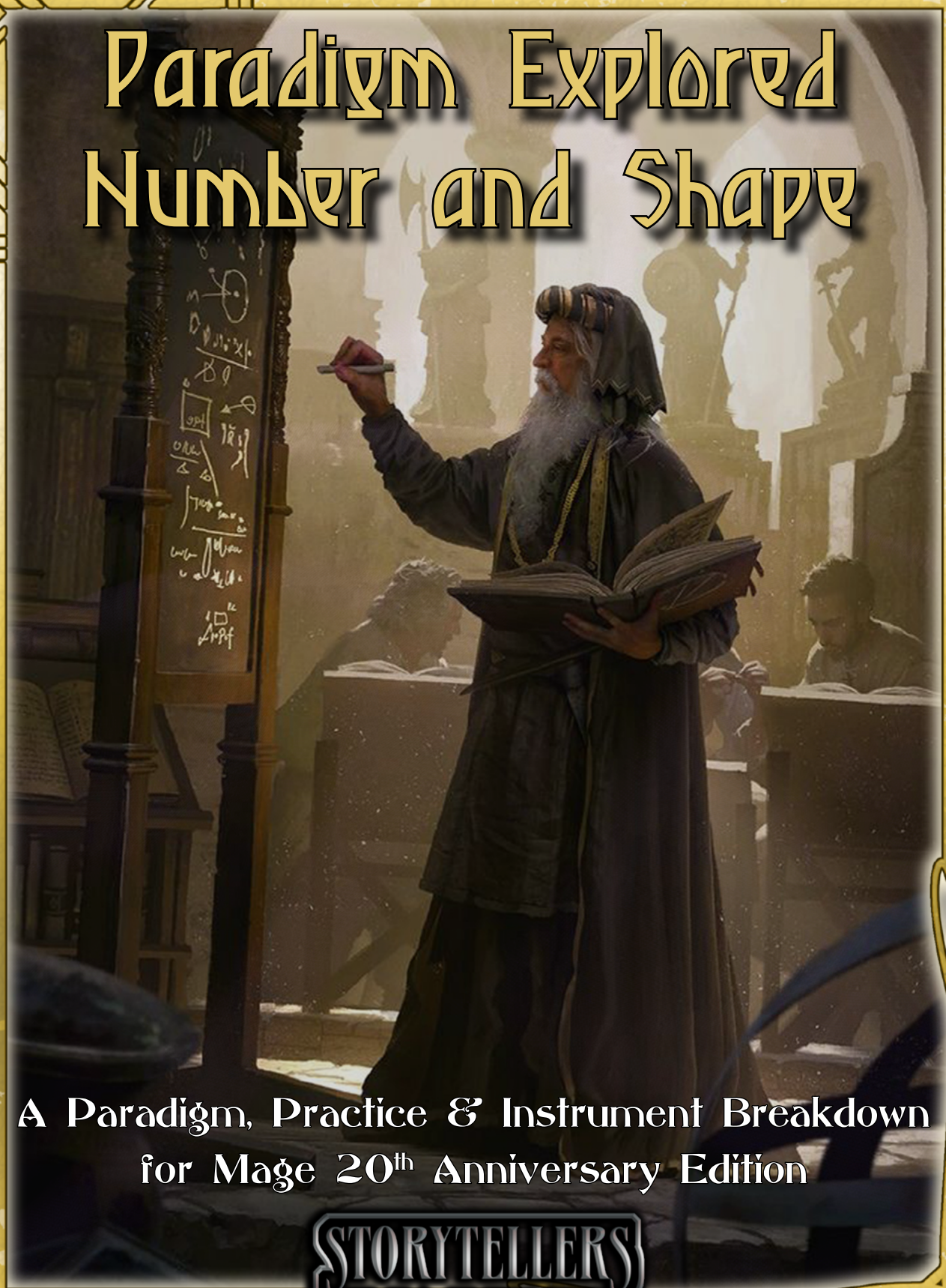
Paradigm Explored
Number and Shape



A Paradigm, Practice & Instrument Breakdown
for Mage 20th Anniversary Edition

Storytellers Vault
Fourth Edition

Paradigm Explored
Number and Shape

Charles Siegel

Credits

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Special Thanks to:

Josh Heath, for valuable prereading to make sure this didn't disappear into simply being esoteric mathematics.

My former professors, whose influence definitely increased the chance it would just be esoteric mathematics.

My wife and son, who both inspire the best game work that I do, one by being a great player and ST, and the other by just grabbing Technocracy: Reloaded the day it arrives and trying to eat it.

VÄSTGÖTAGATAN 5
SE-118 27 STOCKHOLM
SWEDEN

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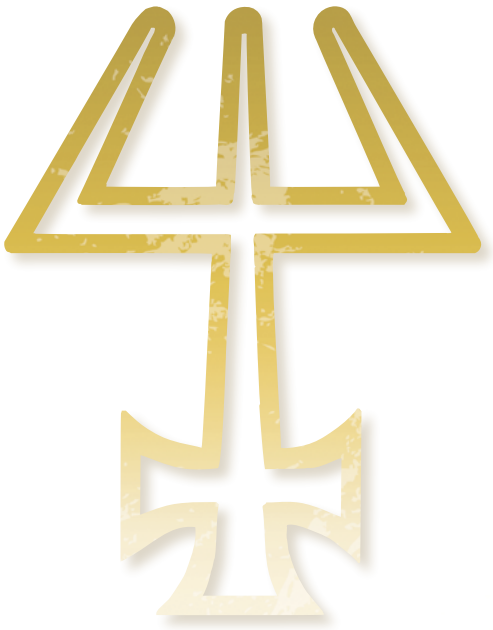
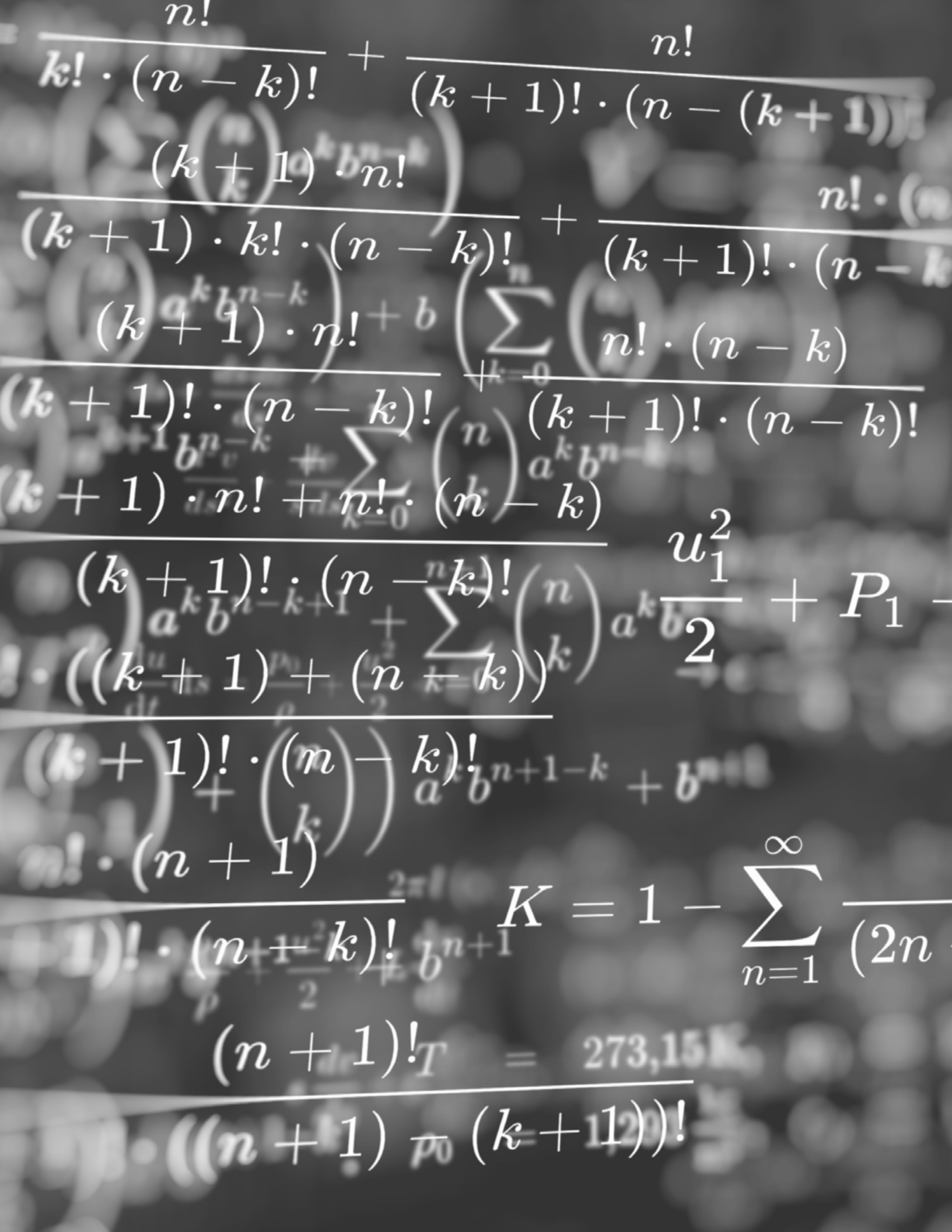
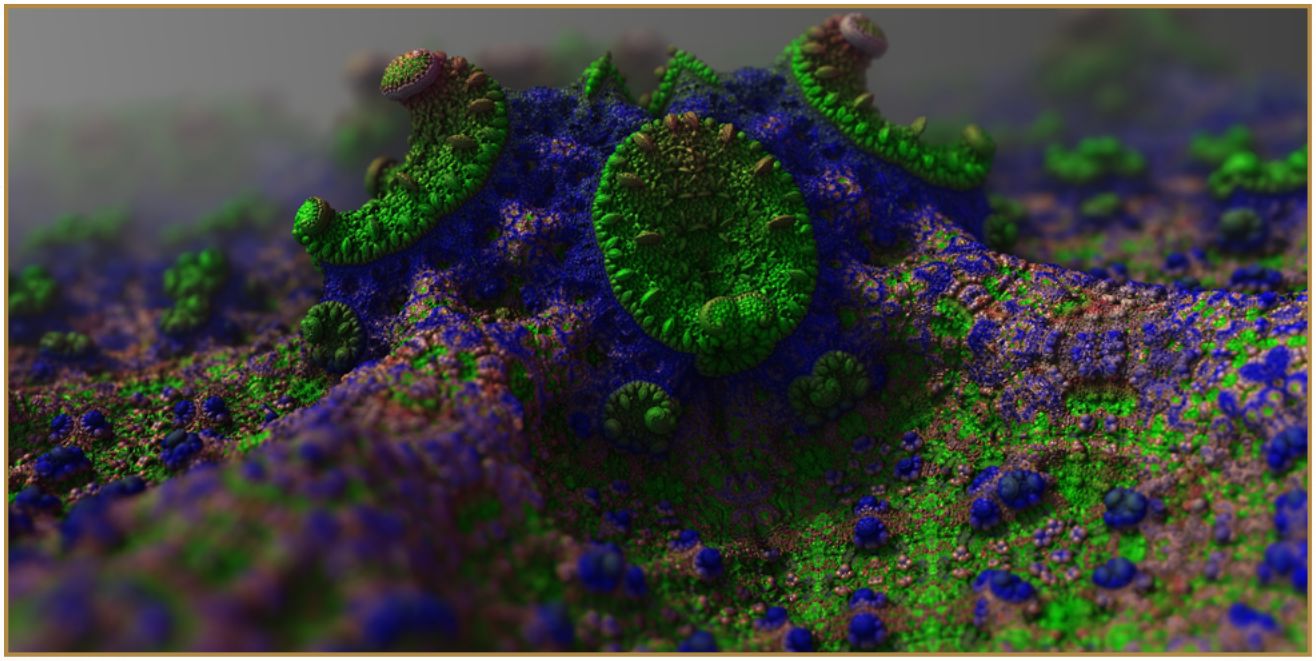




Introduction

Focus in **M20** is complicated. In many ways, the lines between Paradigm and Practices and between Practices and Instruments are blurry. Josh Heath and Terry Robinson wrote **Paradigm Explored: Wyrd and Weft** to clarify and slightly refine the Focus rules and to describe in detail a character with a Norse worldview. Inspired by that project, this acts as an additional example in the series. Instead of showing a Norse mystic, however, this character can be either mystic or technomage, and whose paradigm is defined by mathematics, an element that is often misunderstood and underused in both scientific and mystic paradigms.

As with the character in **Wyrd and Weft**, this character is quite powerful, making it possible to show off a wider breadth of what the Focus can do and how mathematics based Backgrounds can fit into a **Mage: The Ascension** chronicle. To that end, in addition to the extended character sheet, rotes, and wonders, this includes a writeup of the Platonic Realm, a High Umbral Realm where the concepts of mathematics are embodied and can be interacted with and investigated directly.



The Character: Pratap Maraj

Background

Pratap showed a talent for mathematics from a young age. He wasn't a particularly good student: he was disruptive in math and science because he was bored, and in English and history because it didn't come easily to him. He spent a lot of his spare time playing games, including number games, but computer games more generally. Customizing them taught him a bit about programming, though he didn't pursue it seriously for years.

He drifted through school until high school, when both Geometry and Physics captured his attention. Before that, he'd only ever seen math in terms of calculating things, often required to do it specific ways that made no sense, and learning it as a bunch of isolated techniques. Geometry changed that. It was about logic and proof, about connecting ideas that looked different but were secretly the same. And Physics used the insights of Geometry to study the world. In an all night session his senior year, he came up with a new technique to square a circle, one that was novel enough that his teacher later helped him to publish it. Somehow during the process, he had Awakened.

In college he finally made the decision to focus on mathematics over physics, but even in graduate school, he couldn't decide on a specific field. Though Pratap chose a thesis topic, he immediately started writing papers on other topics, establishing himself as a rare thing: a polymath within mathematics, rather than a specialist. He finished his doctorate in only four years, and had been lucky enough to be found by an adviser who was also Awakened. Clint Young introduced him to what he could truly do, and began to teach him Hypermathematics.

Now, Pratap is a tenure-track professor at a public research University. He publishes papers, often taking his Enlightened insights and then distilling their applications down to the point where he can publish them in mundane journals, and has started to take on graduate students. He always looks for people who look at things from strange angles, trying to guide them into their own Enlightenment and teaching them Hypermathematics so that they, too, can advance the field.

Roleplaying Hints

Despite the gulf that exists between you and mundane mathematicians, you are fully enmeshed in mathematical society. So much so that many consider you a genius and feel that if you would focus, you'd be a candidate for the Fields Medal. You don't fit the usual stereotype of the social awkward nerd, either. Among your peers and people who wish they could be,

you're popular. Though often gregarious, you do sacrifice social time for mathematics time on a regular basis. Your personal life is always a bit of a mess, it seems like much of your focus and precision goes into one thing, and that's your mathematics. Even so, the only group of people you truly can't seem to get along with are people who open conversations with "I was terrible at math in high school, glad I don't need it now."

Faction

Pratap is presented without a faction choice. He can easily fit into quite a few factions with little difficulty and no significant modification, including being a particularly focused Orphan or a member of a previously unknown Craft of mathematicians. One of the biggest reasons to avoid selecting a Tradition up front is that this would bias perception of his Focus to make people expect it to be more orthodox for the Tradition, Convention, or Craft that he's listed as a member of.

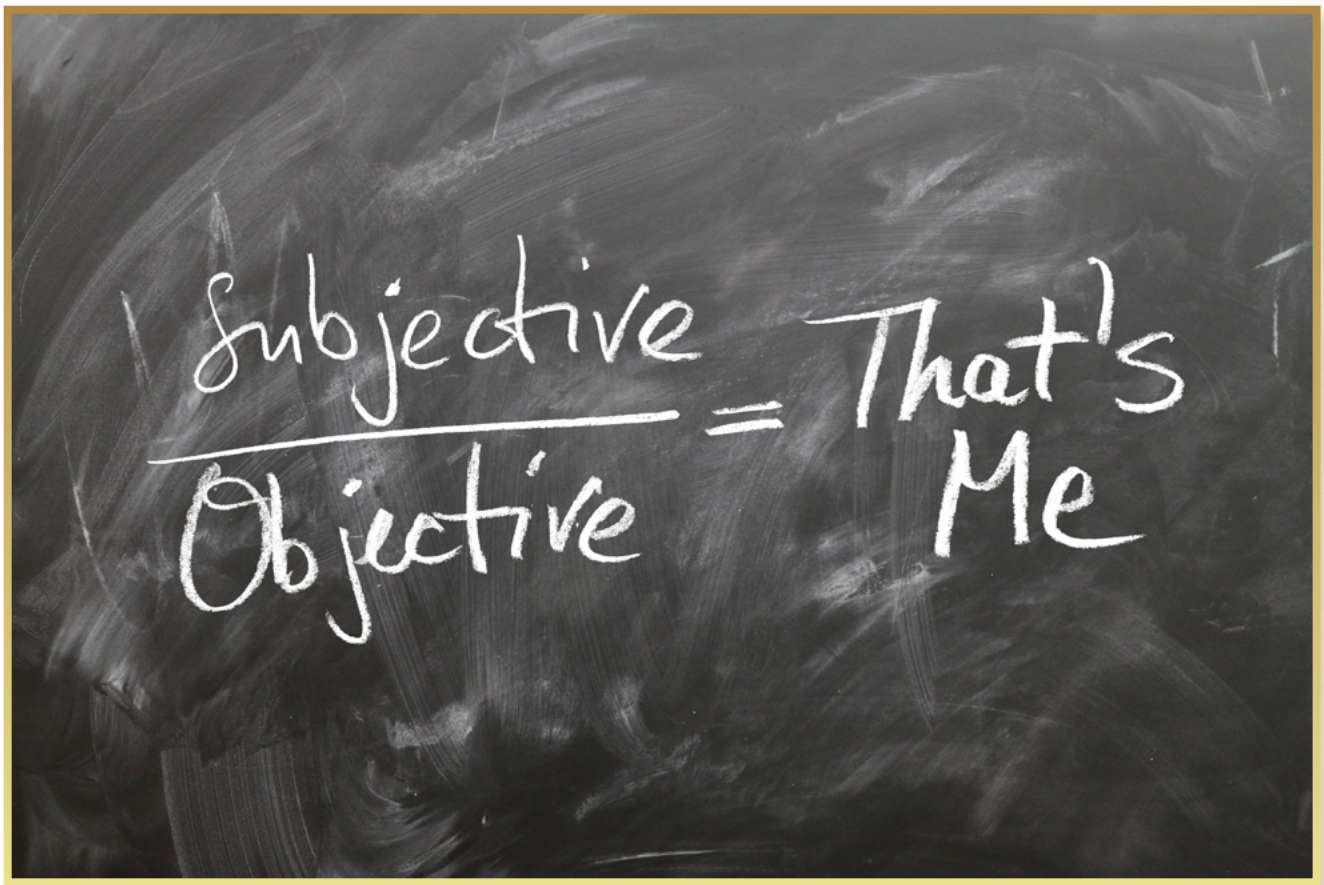
Instead, below are several of the factions that he can fit into particularly easily. Each one describes why he could fit and how he might be changed by the association.

Celestial Chorus

The Chorus has a core belief that first there was One, and then there were Many, and all things are created from the One. This naturally mirrors mathematics, where first there is zero, then from zero, one is constructed. From one, all whole numbers, then rational numbers, and so on, building up everything from nothing, with One as the first nontrivial object. Pratap isn't going to work magick through any sort of God, which he'd see as simply an approximation of a truly universal object, the One, that contains all of mathematics within it. As a Chorister, he is decidedly non-orthodox, seeing a strange vision of the One shared by few of his fellows, but seeks out that Unity with a fervor that can put zealots to shame.

Order of Hermes

Pratap can easily end up a Hermetic. He's heavily influenced by Greek philosophers, from Pythagoras to Plato, and many standard Hermetic tools easily translate into his worldview (for instance, the Gödel Number of a logical statement can act as its True Name, and a person or object is just the sum of all logical statements needed to describe them, because *All is Number*.) As a Hermetic, Pratap would lean towards Sacred Mathematics and Sacred Geometry rather than Hypermathematics. The discipline of the Order of Hermes, particularly



the mental discipline, tends to appeal to people who work heavily with mathematics, and large complex constructions in mathematics can function as High Ritual Magick.

Virtual Adepts

The Virtual Adepts are one of the most natural choices for a Faction for Pratap. Their *Everything is Data* Paradigm is naturally similar to *All Is Number*, arguably it is just a more specific and modern version of it. A Virtual Adept version of Pratap would tend towards the theoretical more than the practical and be less interested in directly disrupting things than in exploring the Digital Web, and the mathematics that underlies it. Some of the more vulgar magick below, particularly using the Axiom of Choice, would be rejected in favor of more complex combinatorial magicks, because he would likely add an Axiom of the form *All Things Are Finite*, unless a computer than can handle infinite input is developed for him.

Iteration X

As a member of Iteration X, Pratap is a member of the Statistician methodology. His Axiomata are fairly in line with Iteration X orthodoxy and require little direct change. His Instruments need to simply be made a bit more concrete. He would not fit in as a field Armature, instead he'd be a lab tech, running the numbers on impossible problems and preparing the theory needed for the more mechanical members of the Convention to build their own Devices.

The Syndicate

The Market is numbers. Pratap fits the Syndicate very well. His magick becomes a bit more subtle, rather than making dramatic changes in front of him, he will tend to prove that something *must* happen which, in turn, makes it happen. Because the Market is numbers in motion, he's a master at reading and manipulating it, slotting into the Financiers.

Void Engineers

Though he fits, Pratap changes substantially as a Void Engineer. The mathematical edifice of Dimensional Science fascinates him, and he would be attempting to push it as far as it can go. Instead of merely using the knowledge that the Platonic Realm exists and visiting it in his mind, he wants to find it to enter it physically, and to see what happens if an actual, perfect mathematical object is brought into the world (in a safe containment facility, of course).

Hollow Ones

Though at first it seems strange to place a mathematician among the Hollow Ones, several figures that they revere were mathematicians or spent time among them. Lewis Carroll, of *Alice in Wonderland* fame was a mathematician in

his day job, and Byron's daughter was Ada Lovelace, the first programmer. As a Hollow One, Pratap adds a romantic streak to his mathematics, mixing in highly structured poetry such as haiku, sonnets, etc. His greatest effects will be proofs written as poetry with evocative imagery, and he might even view a solved problem as "dead," recognizing that he must destroy something delicate in order to create his proofs.

Magick

For Pratap, as with other mages, Focus is broken down into his Paradigm, Practice, and Instruments. His Focus is built around mathematics more than anything else, though it often filters through some combination of the sciences (as applied through technomagick) and through some sorts of mysticism (sacred geometry and numerology are far from strangers). As discussed above, he can fit into several factions, either mystic or technomagical, without much difficulty. His Focus lends itself to both the supremely subtle magickal effect (such as Chaotic Systems) and to the extremely vulgar effects (such as Banach-Tarski or Hausdorff Violation), but rarely anything that simply seems a little bit off, rather than flagrantly impossible or completely plausible.

Paradigm Axiomata

Below are the axiomata that Pratap believes to hold true in the universe. These are some of his most deeply held beliefs, and challenges to any of them are challenges to his sense of self. They're short statements (though explanations are a bit longer) that differ from the common beliefs among Sleepers, even if some espouse similar things, they tend to hold them less tightly. These axiomata are flexible, and small changes or additions to them may be necessary for Pratap to fit into any given faction.

Along with each axiom is a bit of discussion of how that axiom might influence Paradox effects for Pratap. This allows for better flavor than simply rolling a backlash or choosing a random Paradox flaw.

All is Number

Many people, Awakened and non, believe that everything can be represented by numbers. They believe that everything can be quantified and measured and put into numerical terms in order to understand it better. They're missing the point. Things are not *represented* by number, they are actually made up of numbers. Pythagoras espoused an early version of this view and inspired his followers to study and advance the mathematics of their era. They had a very specific notion of number: the only ones that existed were positive whole numbers and their ratios, anything else was heresy. They took this so seriously that, according to some stories, they murdered one of their fellows who proved that the square root of 2 was not the ratio of any two whole numbers.

In the modern world, strange sorts of numbers are much more accepted. Pratap understands that rational numbers aren't enough to describe the full diversity of the universe. He can look around himself and see the instances of irrational numbers (like the square root of 2 and π), complex numbers, and even more exotic things. By manipulating these numbers, Pratap can transform the world around him in fundamental ways.

Paradox: Sometimes, numbers just don't add up. When one number is exchanged for another, and it's the wrong one, almost anything can happen. Paradox backlashes of this sort can range from bizarre and nonsensical non sequiturs to magick being just slightly off in ways that are wildly inconvenient for the mage.

Pure Forms Exist and Can Be Accessed

Perfection exists. Unfortunately, the world that we live in day to day can't support it. Everything here is an approximation. Instead, there is a Realm where perfect things lie. Plato knew this, and asked what sorts of things could exist there? He concluded that only mathematics could be there, and this realm, called the **Platonic Realm** in his honor, was where things like the abstract concept of the number five, a perfect circle, or stranger things with less obvious physical representations exist. This Realm is detailed below.

The existence of the Platonic Realm is interesting, but by itself not particularly useful. There are two keys that are needed to actually make use of it. The first is to know that *All is Number*, or more generally, mathematics, as above. This means that, in fact, *everything* exists in the Platonic Realm in perfected, pure forms. The second is to know that these forms can be accessed by an Enlightened mind. Upon Awakening, a mage is capable of not only perceiving the shadows of these forms in the physical world, but in seeing them directly, and bringing them into being and making real objects closer to their Form.

Paradox: Trying to touch purity and perfection is a dangerous game. This Axiom is the most likely to trap the mage in a Paradox Realm, usually one of pure Form, adjacent to the Platonic Realm. These Realms will be built around whatever mathematical concept was most closely involved in the magick that caused the backlash. The best way out will usually be by constructing a proof that the Paradox Realm itself cannot exist. Ironically, the proof that it is itself a paradox eliminates it.

Shape is Instantiated Number

Numbers and shapes are fundamentally intertwined. The connections range from the simplistic (such as the number

of sides of a polygon) to the extremely complex (the modern theory of arithmetic geometry and geometric coding theory, for instance). Neither can truly exist without the other. While both numbers and perfect shapes can exist only in the Platonic Realm, imperfect shapes can exist in the physical world. Numbers, however, can't directly exist. Though you can have five of something, you can't have "five" abstractly. But a pentagon can and does exist in nature.

It is through shape that number can exist in the world. And as shapes get more complex, they represent more and more complex arrangements of numbers. They end up both being a compact method of representing numbers and also becoming fundamental objects of their own. Manipulating the shape of an object, particularly a very complex one, ends up being the same as doing an extremely difficult computation, and the key to doing good mathematics is to be able to go between the two techniques seamlessly.

Paradox: A shape that is sufficiently complex can represent a system of numbers that doesn't really fit inside of the human brain, and similarly, numbers could represent "impossible" shapes. This Axiom tends to lead to more severe Paradox backlashes that result in Quiet: to process the extreme mathematical situations, the mage has a break with reality. With luck, at least, these breaks are temporary.

The Shape of a Thing Determines its Nature

Pratap believes that any given thing has a nature, and that nature is determined by its shape. Anything in the shape of a hammer *is* a hammer, though it may not be a very good hammer. Shape, though, goes all the way down: the arrangements of atoms is a shape, the vibrations traveling through a medium are a shape, even the contours of thought are shapes to him, and every detail of the thing can be read from this shape.

They key thing is that this means that changing something's shape can change everything else about it. Careful changes to shapes (which will require complex calculations to determine) can achieve almost any change in the world possible. Conversely, a change to a thing will necessarily change its shape. Someone who is particularly attuned to shapes will be able to detect even subtle, hidden changes in people and things around them.

Paradox: Paradox changes things, and often in strange ways. It can result in impossible shapes, like some of the images created by Escher and Penrose, or it can just radically change the shape of an object, or worse, a person. This sort of Paradox effect is rarely subtle, and often causes Pratap to have to hide out in a safe place until it has passed.

Practice Elements

The Paradigm Axiomata above define a worldview. Pratap's Practices explain how that worldview allows him to manipulate Reality through mathematics. His Practices are what varies the most depending on his loyalties, with the below supplemented by more common Practices like Hypertech and High Ritual Magick as necessary.

Hypermathematics

Not simply advanced mathematics for the Awakened, Hypermathematics is a technique that uses the increased toolset available to mages to do advanced mathematics in ways that are difficult or impossible for Sleepers. Awakened mathemati-

cians are capable of conceptualizing things far outside Sleeper experience, giving them access to objects Sleepers would have no interest in as they model phenomena completely alien to them. One branch of hypermathematics focuses on the study of these objects, making it possible to develop sciences that study the Umbra and spirits, like the Dimensional Science developed by Tychoides for the Void Engineers or any number of strange Etherite theories.

Another substantive branch focuses on constructions. Traditionally, there are several methods of proving the existence of an object that don't provide a construction of it. Hypermathematics contains strange axioms that make those constructions concrete: they can always find the choice function guaranteed by the axiom of choice, for example, or build an object out of a proof by contradiction. The applied hypermathematician can then actually perform these constructions, or approximations of them, in the physical world, resulting in bizarre and impressive effects.

Geometry

Distinct from hypermathematics, geometry as a Practice is the use of any sort of geometric figure or reasoning in magick. For most mages, geometry is specialized enough to be an Instrument, but for Pratap and other Enlightened Mathematicians, it's much broader, and constitutes a general technique and pattern of thought rather than a mere tool. After all, if *the shape of a thing determines its nature* then the study of shapes and their transformations is the ability to control the nature of reality.

Several of the Instruments below are fundamentally geometric in their applications. By studying geometry and making use of it, Pratap is able to turn those Instruments from the tools of a mathematician into the tools of a mage. This Practice is most useful to him because it, sometimes in conjunction with Hypermathematics, allows him to first determine what properties he needs something to have, then calculate the shape he needs it to be in, and finally determine what transformations are necessary to achieve it.

Proofs

Mathematics lies underneath Reality. It's the output of logical deductions from whatever axioms are under study, and these deductions are true no matter what the world looks like. Through proofs, a mathematician can do more than simply change the world: they can establish that the world must always have been some way, and cannot truly be any other... at least, so long as the premises are true. Often, a bit of work is needed to make sure that a situation fits the hypotheses of the theorem being proved, but once it's done, the goal falls into place immediately.

Instruments

To apply Pratap's Practices to the world, he uses the Instruments below. No Sphere recommendations are given for them, as these Instruments are flexible and relevant to classes of effects that cross the boundaries of the Spheres in ways that sometimes seem difficult to capture. Most effects will involve several of them, for example, he may reach a Flow State while working on at a blackboard with Chalk using the Axiom of Choice to handle particularly complex Equations. Or a Proof Assistant may compute the Numbers that correspond to extremely complex Knots representing objects that he wants to transform. In fact, it will be very rare and often uncomfortable for him to use only a single Instrument in an effect: to him, chalk doesn't do anything, but it allows him to access numbers and equations and figures in ways he couldn't otherwise. Similarly, a complex geometric construction drawn on a page is dead and static, until he's drawing it, it has no power.

Axiom of Choice

The Axiom of Choice is a strange and controversial thing in mathematics. As an axiom, it can neither be proved true or false, it's a basic assumption of the system. The controversial question is whether it is a "reasonable" axiom to use. There's several reformulations, and they range from "that should definitely be true" to "that's ridiculous, there's no way that's true" and yet, if one is, all are. On top of that, it allows some bizarre constructions. And all from the fairly simple rule: if you have a bunch of collections, you can pick one thing from each. The trick that makes it viable in normal mathematics is that you know that there is some way to do it, but you might not be able to write it down.

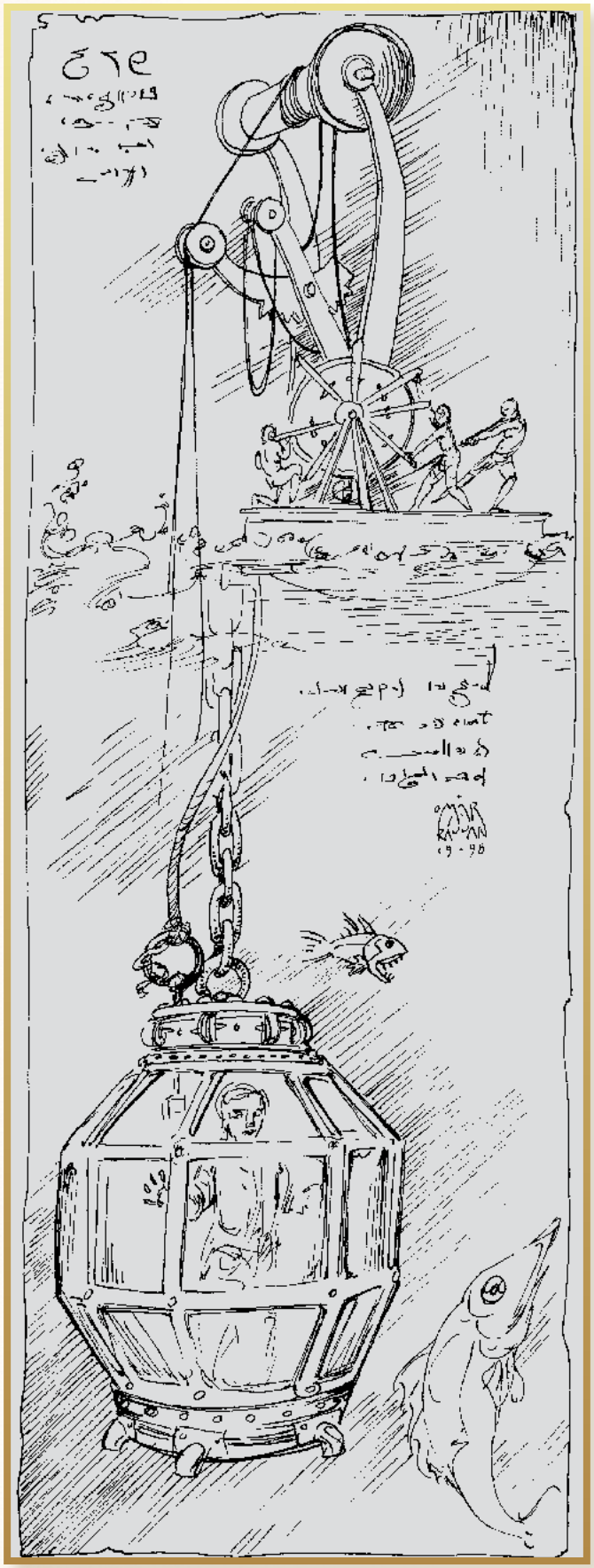
The mind of mage, though, can actually find the choice. This brings strange, abstract things to reality. Whether they are infinitely complex cuts, strangely structured thoughts, or geometries that violate the very concept of length or area.

Chalk

The preferred tool for mathematicians writing on boards. As a group, they have rejected the concept of the whiteboard and chosen to stick with blackboards, refusing to give up the feeling of chalk in their hands for the smoother, less tactile dry-erase. Many even go so far as to say that writing something in chalk on a board, as opposed to typing something, writing with a pen or pencil on paper, or, in a worst case, using a dreaded whiteboard, helps them think, and leads them to better results and stronger papers. As such, chalk often ends up as an all-purpose tool, required by Awakened mathematicians to do just about anything. This is especially true for them if they can get their hands on **Hagomoro chalk**, even the non-Charm version.

Figures and Knots

Most practitioners of magick think in a fundamentally two-dimensional way about shape. They think of plane geometry and the figures it contains. This view is limited, and painfully so for someone using Geometry as a Practice. Plane figures have their uses, they build up everything else, they are often the simplest possible geometric objects to manipulate. Triangles have their own entire field of study, trigonometry,



and circles are just a special case of conic sections, which show up ubiquitously in nature.

Possibilities explode in higher dimension. Knots and links become possibilities, with their own structure of prime knots (that cannot be decomposed into simpler ones) that have been thought by scientists of the past to represent atoms, and more complex, compound knots built out of them, as well as other special kinds. Polyhedra also exist, from the dice used by gamers to complex stellated shapes of mystical significance. Beyond those, there are curved surfaces, with however many handles are necessary and can be stretched and pulled into new shapes that are still somehow the same.

Things truly get outrageous beyond the third dimension. Harder to depict or think about, these shapes can be interesting in their own rights, can symbolize strange travels (such as the *tesseract*, a four-dimensional cube, and its role in L'Engle's *A Wrinkle in Time*), can be understood through analogy (as in Abbot's *Flatland*), and can themselves shed light on the behavior of three dimensional objects that we think we're more familiar with.

Flow State

Often compared to meditation, Flow State is full immersion in whatever you're doing. It involves being 100% focused on the task, shutting out all distractions, and usually enjoying it in a way that is impossible when there are distractions. It is a delicate state, though. Flow can be broken easily, whether at work when a coworker drops by your desk or at home thanks to a screaming child. It's powerful, but fragile, and can push a person to new heights. For some, it can even reach the level of an out-of-body experience, where their mind and body seem to be separate but still perfectly coordinated on the task at hand.

Formulas and Equations

Though many technomages and some mystics use formulas and equations in their work, Awakened mathematicians bring them to the center of things in a different way. While a non-mathematician might prefer that they have the right formulas before setting up a ritual circle or an experiment, they can go ahead without it, with the effect itself being the ultimate arbiter of truth. For the mathematician, though, the equation is the object they are working with. Any other aspect of reality can only be manipulated to the extent that an equation or formula contains it or describes it. However, though a scientist may tell them that they are focusing on a representation rather than on the thing they want to study, the mathematician is more likely to identify an object with its model, and manipulate it with equations and formulas directly, rather than treating everything as varying degrees of approximation.

The tendency to work with equations is so ingrained, that mathematicians have drawn strong analogies between how they work with them and how things in the physical sciences

behave. Borrowing the term from a certain type of celestial alignment, mathematicians speak of *syzygies*, the relationships between equations. By studying them, more information can be derived from equations, and objects that the equations may have seemed not to describe fully are accessible.

Numbers and Numerology

Numerical coincidences often point the way to interesting things in math. Though they will often joke that something is "numerology, not mathematics," mathematicians keep their eyes out for strange coincidences of numbers, even if a bit of work is necessary to find them. These coincidences can show that wildly different things are secretly the same, allowing one to be manipulated through the other. The most famous modern example is called "Monstrous Moonshine" relating some extremely high dimensional geometry related to the **Monster Group** to the coefficients of a the *j*-function, which has been well-understood for over 150 years.

Proof Assistants

It's impossible to truly separate mathematics and computing. The two fields feed off of each other: early mathematicians were often simply looking for techniques for computing things, after all. For most of the history of both fields, the flow of ideas moved largely in one direction. Although computing examples allowed new theorems to be discovered, mathematics tended to contribute more to computing, whereas computing provided very little to rigorous, proof-based mathematics.

This changed dramatically in 1976, when the Four Color Theorem was proved. It was the first major theorem (that any map can be colored in using only four colors so that no two regions that border each other are colored the same) to have an extensive part where a computer checked a large number of cases, resulting in a proof that was not entirely written by human beings. These proofs have only become more common since then.

Now, an entire new field of study has formed consisting of "proof assistants." These are pieces of software that will perform some operations to aid in the writing of proofs. The most powerful ones can prove basic theorems by themselves. A lot of current research is going into designing proof assistants that can convert between a human-readable proof and what's called a "formal proof" which is a wholly unambiguous proof using precisely the laws of logic and things that had already been proved. The goal being to guarantee that false theorems are never accidentally accepted by the mathematical community.

In the hands of a mage, a good proof assistant can take the time to write a proof of a statement from hours to minutes. Practically, this means that fast-casting on the fly is possible, even in this relatively rigid and formal Focus. Mages also have access to proof assistants beyond what mundane humans can create (see below).

Constructing Effects

Building mathematical effects can be intimidating, especially for people without much math background. But just as Hypertech doesn't require an actual scientific or technology background to be creative with, Hypermathematics gives the leeway needed for the creation of effects. All that's really needed is a general sense of where to draw lines between fields (see The Platonic Realm for some ideas on this).

One method is to work backwards. Begin with an effect that the character wants to perform. Then decide what sort of mathematics it relates to. Once a field (or multiple fields) has been chosen, make up a "theorem" that explains it with that flavor. The goal should be the conclusion of the theorem, and the requirements of the theorem should have something to do with the situation the character finds themself in.

In character, such a thing done on the fly would likely be considered a "proof sketch" or "outline" that doesn't do everything, but is good enough to work for some time (that is, an improvised effect). Once the character refines it into a rote, they can consider it "proved" and relatable through Awakened mathematical journals, should they desire to do so.

For some examples of fictional theorems, there is a niche genre called Mathematical Fiction. A large collection of works can be found at the Mathematical Fiction archive (http://kasmana.people.cofc.edu/MATHFICT/). Some specific recommendations are:

The works of Rudy Rucker especially *Mathematicians in Love*

The Algebraist by Iain M. Banks

Imaginary Numbers and *Calculated Risks* by Seanan McGuire

And He Built a Crooked House by Robert A. Heinlein

The Orthogonal Trilogy by Greg Egan

The Age of Unreason Quadrilogy by J. Gregory Keyes

Flatland by Edwin Abbott Abbott, which is half mathematical treatise and half scathing condemnation of Victorian social mores

For information on mathematical fields, the first few paragraphs of Wikipedia articles tend to be written for a general audience, and links can give more ideas of how various objects and ideas work and which people worked on them.

Techniques

The Focus described above comes with a collection of rotes and wonders attached to it. Pratap and mages like him tend to use a similar set of tricks and find comparable wonders useful. For mathematical mages, though, there are fairly few objects that can help them do their work. There's an old joke that mathematicians are cheap: they only require paper, pencils, and wastebaskets. This is even largely true of Awakened mathematicians, they require much less in the way of resources than many other mages. Their magick, however, tends to be a bit vulgar, because though most people accept math as true, very few understand it or believe it can affect things directly.

Rotes

Banach-Tarski

••+ *Matter,* •• *Prime*

The Banach-Tarski Paradox is one of the most famous bizarre constructions in mathematics. A solid ball can be decomposed into five sets of points, one of which is just the center, and then rearranged into two solid balls the same size, duplicating it. Various refinements have been made, including the fact that these pieces can be continuously pulled apart (that is, they aren't tangled around each other) and that any solid object can be rearranged into any other solid object...not even necessarily connected, with a finite number of operations. The tricky part, of course, is that the sets needed to do this cannot be written down: they are discovered only through the use of the Axiom of Choice

Paradigm: Shape is Instantiated Number

Practice: Geometry

Instrument: Axiom of Choice

System: The mage carefully examines an object and then holds in their mind what they want to transform it into, some object that is usually substantially larger than the original, most commonly simply duplicating it. They then work out the number of pieces that will be needed and use the Axiom of Choice to find them, performing the infinitely complex cuts necessary to create those sets in reality in a state where they are not entirely conscious of doing it. This results in the new object created from the old one, or the desired duplication. The Prime requirement may be dropped if the new object is simply reshaped from the old one, with no changes to its makeup or mass. The rank of Matter necessary is determined by the starting and ending configurations, and for exotic matter other Spheres may be necessary (for instance, Forces for radioactive materials).

Chaotic Systems

••• *Entropy or* •• *Time*

In mathematics, chaos has a specific meaning. A system is chaotic if a small change to the system now can cause wild changes in the future. Fundamentally, this makes these systems unpredictable, because you can never know things precisely

enough to actually get the right answer. Unfortunately, almost every aspect of human society is chaotic, as are things like dice rolls, weather, the three-body problem, billiards dynamics, and so much more.

Paradigm: All is Number

Practice: Proofs

Instrument: Proof Assistants

System: The imprecision of measurement is something that can be overcome with a proper proof assistant for mathematical mages. The Proof Assistant has to be relied on to evaluate careful measurements and observations. It then runs simulations forward with the most accurate techniques available. This rote has two versions. The simpler one, using the Time Sphere, predicts the outcome of the chaotic system observed: it can tell you what the weather will be tomorrow or what the behavior of a group of people (not a specific person) will be like. The Entropy version is somewhat more powerful. With a number of successes based on how large a change is desired (one for trivial changes, but five or more to make truly dramatic ones) the mage can calculate precisely how to influence a chaotic system to cause it to fall out in their way.

Explore the Platonic Realm

•••• *Mind,* ••• *Correspondence*

The Platonic Realm is where pure mathematics lives. Not "pure" in the sense of "not applied" but rather the pure essence of the things. By focusing on a specific branch of mathematics and entering a Flow State working on proving some complex theorem within it, the mage targets a specific region within the Realm. The Platonic Realm is detailed below.

Paradigm: Pure Forms Exist and Can Be Accessed

Practice: Proofs

Instrument: Flow State

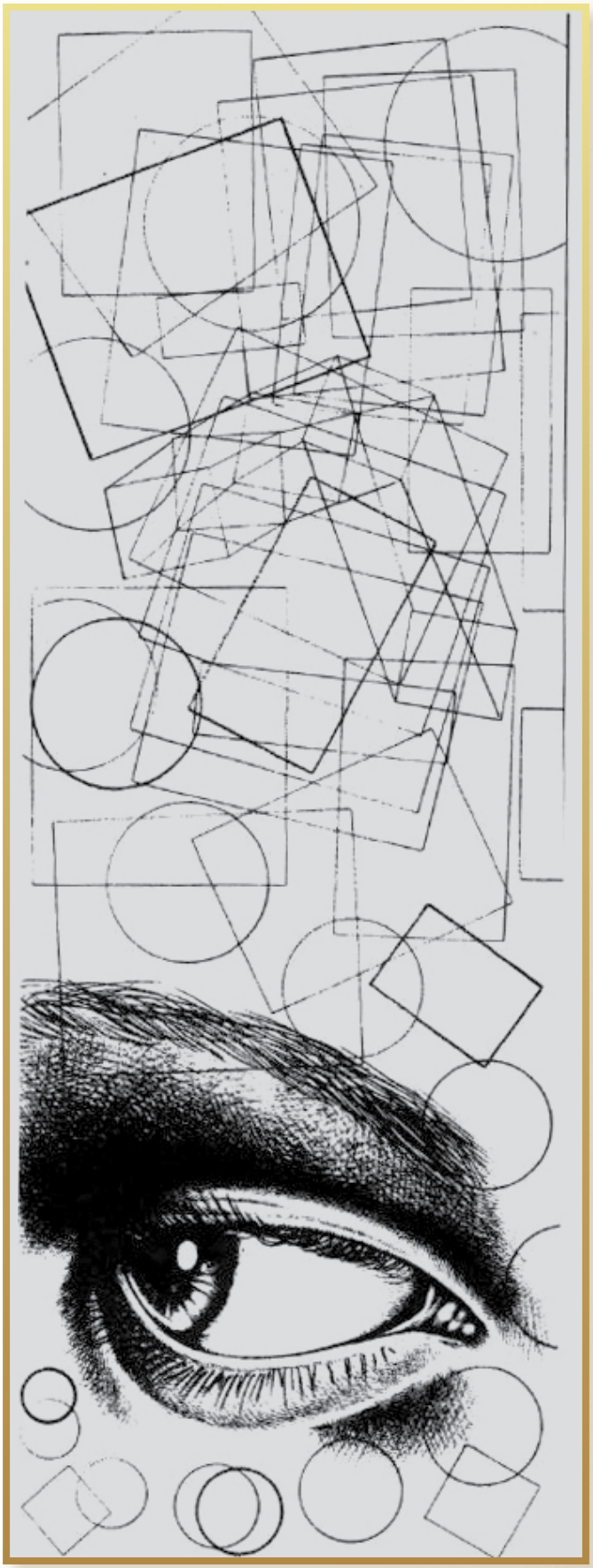
Systems: By performing this rote precisely correctly, working out a complex proof in the area of interest, the mage catapults their Astral self past the Cave and directly into the Platonic Realm. With three or more successes, it even sends them to the part of the Realm they are focused on, and exceptional successes can summon a mathematician to guide them. If they are working on a proof of an open problem when they achieve Flow, that guide might even be able to give them an insight into solving it, offering a -1 difficulty on subsequent rolls to solve it.

Fixed Point

••• *Correspondence,* ••• *Forces,* •• *Entropy*

One of the most useful sorts of theorems for understanding geometry is the Fixed Point Theorem. Though there are many more precise versions, determined by what you can assume about the function, they all come down to a simple statement: no matter what you do, any reasonable transformation will leave one point alone.

Paradigm: Shape is Instantiated Number



Practice: Geometry

Instrument: Figures and Knots, Chalk

System: By marking out both the region to be transformed and drawing shapes that indicate what sort of transformation is going to happen, the mage checks the hypotheses of fixed point theorems. When they activate the transformation, everything around the region is scattered seemingly at random, with everything landing in some other spot in the same region. The mage, however, stands are the proverbial eye of the storm, the fixed point that nothing passes through or lands on. This causes two dice of Bashing damage per success to anything in the region other than the mage, with the damage upgraded to Lethal if there is a substantial number of sharp objects to move around. These dice can be removed by successes on a Dexterity + Athletics roll (difficulty 6) to dodge.

Cone Point (Co-location)

•••• *Correspondence*

In mathematics, a cone isn't just what you get when you roll up a piece of paper until it has a point. A cone extends on the other side, looking like what most people would consider two cones, meeting at a single point. By manipulating the distances from a given point, a mage can pull two locations together, making them meet at a point like that double-cone so useful in geometry.

Paradigm: All is Number

Practice: Geometry

Instrument: Numbers and Numerology

System: The mage performs a complex computation that demonstrates that the distance between two points, one of which is where the mage is currently located, is decreasing to zero. Once it reaches zero, the mage can interact with the area surrounding each point equally, including passing objects from one to the other (albeit with an addition of • Matter). One thing to remember: the mage cannot act independently in the two places! There is still only one copy of the mage, they're just interacting with both at the same time.

Inside a Jordan Curve (Ward)

•• *or* •••• *Correspondence, optional auxiliary Spheres*

A Jordan Curve is any path that is continuous, doesn't intersect itself, and starts and ends at the same point. The Jordan Curve Theorem states that a Jordan Curve always divides the plane into two pieces: the inside and the outside, and that you can tell them apart. By drawing a Jordan Curve, a mage marks what is inside the boundary and what is outside.

Paradigm: The Shape of a Thing Determines its Nature

Practice: Geometry

Instrument: Figures and Knots

Systems: By marking off a space, usually done with a long loop of string or by drawing with a piece of chalk, though any method of creating a non-self-intersecting loop around the region to be protected, the mage creates a Ward. The •• Correspondence version creates a minor Ward that can alert the mage if anything crosses from outside to inside. The •••• Correspondence variant creates a Ward that actively stops anything from crossing without beating the number of successes to get in. Auxiliary Spheres can be used to specify what the Ward is protecting against, cause it to do damage to anything that attempt to cross over, and various other effects that require a boundary.

All Nighter

••• *Life*

Sleep is for the weak. This is a common sentiment among many people, and especially among mathematicians. If you want to be able to make progress on research, teach your classes, and have any sort of social life, sleep is going to be sacrificed on that altar. For mundane mathematicians, the only option for handling that is caffeine, in large quantities, or other, less legal, stimulants. For mages, more options exist.

Paradigm: Pure Forms Exist and Can Be Accessed

Practice: Proofs

Instrument: Flow State

System: Though not extremely helpful in other areas, a mage can go days without sleep as long as they're working on a problem. The key is to enter a Flow State while working, and allow their mind to touch the Truth and bring it down to Earth in the form of a Proof. For each success on the mage's Arete roll, they can stay awake without penalty for a day, up to five days. After that, they suffer a -1 penalty to dice rolls, increasing for each five days the character stays awake. They must, however, stay focused on a single task for that time, only taking minimal bathroom and food breaks. After the task is finished, the mage will sleep for a day, plus one day for each -1 penalty they have accrued. This rote is most useful for preparing and then performing a large scale ritual.

Beyond Rademacher (Transmutation)

••+ *Matter*

Hans Rademacher defined several "moves" that allow a mathematician to manipulate diagrams of knots that don't change what the knot is, but might make it simpler to understand or do computations with. Knots can also be split into *prime knots* which can't be simplified any further. For some time, chemists and physicists speculated that prime knots and atoms behaved in very similar ways, down to prime knots having two methods of combining them (one into larger knots, the other into *links* which are groups of knots that are wrapped around each other) as do atoms (ionic and covalent bonds).

Paradigm: The Shape of a Thing Determines its Nature

Practice: Geometry

Instrument: Figures and Knots

System: Though the knot-atom correspondence has been rejected by modern science, a mage can still take advantage of it. By computing the knot or link that describes a given substance and then the one that describes another one, a mage can transmute the substance to a new form. This requires using moves that go beyond the Rademacher moves: the knot or link is being changed, after all. But with cutting and gluing, any knot or link can be transformed into any other, so truly magnificent transmutations become possible.

Cram Session (Empower Mind)

• *Mind*

When things get tough, you need to be *better* than you normally are. A problem is hard, so you need to be smarter, you need to think more quickly, perhaps you just need to see something you couldn't see on your own. For mages, mental enhancement is possible, and sometimes is just a matter of cleaning up their mental state and focusing properly.

Paradigm: Pure Forms Exist and Can Be Accessed

Practice: Hypermathematics

Instrument: Flow State

System: By entering a Flow State, the mage can increase their Mental Attributes as per Mental Empowerment. This effect is always temporary and can only last for a single scene. As the mage has focused everything they have, tuning their mind to the problem at hand, this increase in Mental Attributes disappears the moment that they consider some other problem. Up to a maximum of five, this provides one dot to a Mental Attribute per success.

Universal Language

••• *Mind*

Communication can be difficult, moreso when the people trying to communicate are from distant places and don't speak one anothers' language. In specialized fields, there are often solutions thanks to a shared vocabulary and knowledge base. Few fields, though, are as universal as mathematics, to the point where mathematics and astronomy are the languages used to try to communicate with alien beings, if any are out there.

Paradigm: All is Number

Practice: Proofs

Instrument: Flow State, Numbers and Numerology

System: To allow seamless communication, the mage must induce a Flow State in both themself and the person they are trying to speak with, on the same problem, usually by writing it out in technical notation that is largely language independent. If this can be achieved, then so long as the two are working on the problem, the language barrier disappears. They can communicate quickly and effectively through a combination of symbols, common references, and half-finished computations. Some information not related to the problem at hand can even be passed along, though Wits + Science (Mathematics) or Wits + Academics (Mathematics) rolls at difficulty 8 must succeed from both of them for the information to come through correctly.

Deadline Push

••• *Time*

Deadlines are the *worst*. Sometimes there just isn't enough time to get something done. You can't do 20 hours of work when something is needed by 5 PM, or else. Fortunately, time is nothing but a sequence of numbers. It can be manipulated just like any other sequence, and you just have to make it converge to the right place fast enough...

Paradigm: All is Number

Practice: Hypermathematics

Instrument: Numbers and Numerology

System: Given that time is just a sequence of moments the mage indexes them and modifies them to come more closely together. Getting more moments between now and then means you can get more done. This is not a combat effect, so it doesn't grant extra actions. Instead, the time between casting and the

deadline is increased from the mage's point of view. They get an additional period for each success. So with a deadline in 4 hours, two successes gives the mage a total of 12 hours to finish what they need to accomplish.

Wonders

Hagamoro Chalk

Background Cost: 2 pts. per stick, each stick can be used 10 times

Hagamoro Chalk is some of the most highly prized chalk in the world. Famed among mathematicians for the fact that it doesn't leave dust all over you when you use it, it is often brought out for distinguished speakers. Anyone else who attempts to use a department's stash of the stuff will be chased off, and treated as something of a pariah afterwards. This only became more dramatic after the Hagamoro company shut down in 2015 due to declining demand for chalk worldwide. Though the brand has been picked up by a South Korean company, many still swear by the original.

There is a legend that it is impossible to write a false theorem using Hagamoro Chalk. For the normal chalk, even when it was produced in Japan, this is, of course, not true. However, a few boxes of the chalk each year were produced as charms by a Japanese mage working in the factory. No new sticks of Hagamoro Chalk have been made this way since 2015, making them a rarer and rarer commodity which Awakened mathematicians will fight over, tooth and nail.

Systems: With the special Hagamoro Chalk (sometimes called True Hagamoro Chalk), the legend is true. When used properly, false theorems cannot be written. Though it won't write the closest true statement to the one the user wants, any attempt to write a false statement will come out smudged and illegible, giving the user the valuable hint that they were on the wrong track. When used on any roll to do mathematics (or something heavily mathematical), Hagamoro Chalk gives a -2 difficulty bonus. Even better, when used on a magick roll involving mathematics, it also cancels one point of Paradox for a successful effect.

• • Entropy forms a stronger version of Ring of Truth makes it impossible to write false statements with the Hagamoro Chalk.

• • • • • Prime provides the Paradox cancellation

Glabrum Computer Algebra System

Background Cost: 6 pts.

Enlightenment: 4

Primal Energy: 20

Computer Algebra Systems (CASs) are becoming more and more essential to modern mathematics. Software capable of manipulating symbols rather than just numbers takes a lot of the load off of the back of the human trying to get things done. Lots of CAS software exists, but Glabrum is unique: it's designed for use in hypermathematics for the Enlightened.

Though no one is willing to admit that they are behind the software, it almost certainly comes out of either the Virtual Adepts or Iteration X. In any case, it's available to mages who know where on the Digital Web they need to look, and at prices that are reasonable considering all that it can do.

The Glabrum CAS reduces the time it takes to do computations of all sorts. It even takes things that would take too long to work out by hand and makes them possible. On appropriate hardware, it can even act as an Instrument for many sorts of mathematically focused mages, even if it or computer algebra systems are not normally something they can use.

• • • Time compresses the time it takes to do a computation. Spend one Primal Energy, plus one per success. The amount of time needed to perform a computation is divided by the amount of Primal Energy spent. So a computation that takes an hour normally is reduced to 20 minutes with two successes (and thus three Primal Energy).

• • • • Time lets the system work by using the time stream itself to perform the computation. Though no active user of Glabrum has figured out how it does it, this makes computations that would normally take far too long to ever finish end in minutes. It, however, requires at least 3 successes and costs 15 points of Primal Utility. But in exchange, any computation can be completed in fifteen minutes. The process is particularly taxing, and so if it is used more than once in a day, even with additional Primal Energy added, Glabrum will crash, and be impossible to use again for six months.

• • Entropy allows Glabrum to perfectly predict the outcome of simple random events, like dice rolls, card shuffles, etc. Once human agency is involved, it can't do it anymore, but simple random numbers can be predicted, allowing it to get correct answers when it would be otherwise impossible to do so.

Hypermathematics: A Concise Introduction

Background Cost: 8 pts.

Hypermathematics: A Concise Introduction is a Primer with a somewhat tongue-in-cheek name. Clocking in at 681 pages, it seems to many students that it is more likely to find use as a bludgeon than as a textbook. It is, however, a textbook, and an extremely effective one, written by Ganit Meller of Iteration X and Tadao Kondo of the Void Engineers in 1977. Sixty-three copies were made, one for each student in their Introduction to Hypermathematics course in that year, and it has never been reprinted, leaving those as the only copies in existence. Several have been destroyed, more have been lost, and

the Technocratic Union is only in possession of twenty-seven of them anymore. Few are concerned because anyone who achieves Enlightenment through this book are certainly going to join the Union. Except, of course, for those who don't.

The book itself appears as a mathematics textbook. Unusually thick, but with the famous yellow cover of a series it is not technically a member of, causing it to blend into the collections of any mathematician that may end up possessing one. The inside is completely baffling to the unEnlightened, and Enlightenment is the only path to making sense of it. The axiomatic systems appear convoluted and strange, the theorems seem unmotivated and bizarre, and worst of all, even the best and brightest who don't make it over the hurdle of Awakening can't make heads nor tails of the proofs.

Hypermathematics: A Concise Introduction covers both sides of the discipline. The first part of the book covers aspects of mathematics that are beyond with the Sleeper brain can manage, with extremely complex proofs condensed beyond seeming reasonable, and all of the other difficulties above. Those few who manage to grasp this reach the second half of the book, titled "Constructions" which is more hands on and practice. This part contains all of the rotes above, as well as general technique for designing similar effects through the non-standard constructions available in hypermathematics.

Legend has it that any student who manages to successfully solve every exercise in the book and fill all of the gaps in the proofs will achieve true Enlightenment, Ascending to some higher plane of existence where all of it becomes obvious rather than painstakingly difficult work. No one has, however, as there are over 1000 exercised in the book, every major theorem's proof has omitted steps, and some of the question are research problems that even the great Tychoides couldn't make any progress on.

Backgrounds

Avatar

Your Avatar takes the form of a circle and a square of equal area. They give contradictory advice, though both turn on you if you liken them to the angel and devil that sit on someone's shoulder in cartoons. The circle's advice tends towards the primal, demanding a focus on more fundamental and foundational mathematics and problems, to understand how the world is broken and how mathematics is incomplete. The Square, on the other hand, wants to build structures, understand the highest reaches of mathematics, the most complex parts of it that have as little relevance to the world as possible. Recently, there has been a third voice, which seems to occur on the strange occasions where one transforms into the other. You've begun to suspect there is a higher dimensional object that the Circle and Square are both aspects of, but you have yet been unable to see it.

Sanctum

Pratap's Sanctum consists of his office. He has a complex modern blackboard that allows him three slates of work, each of which contains work on a different problem. It's well stocked with chalk, and he can always walk down the hall to claim some of the Tass from the Limestone Tree. Perhaps most importantly, his Library is contained in the Sanctum, giving him access to both mundane math and hypermathematical knowledge.

Companion: SABOOT Proof Assistant

The Sapient Artificial Bot Operating On Truth, or S. A. B. O. O. T. (Urdu for "proof") is an AI powered proof assistant. It can prove new theorems, though it lacks the true creativity of a human mathematician. Currently it lives in (is installed on?) Pratap's laptop. The two of them work together to solve extreme problems within mathematics, taking advantage of the fact that they think fundamentally differently. They've been working together for years, and Saboot acts in the role of a Companion to Pratap, feeding on the energy released from Pratap using up chalk from the Limestone Tree when they are discussing a mathematical problem.

Attributes: Charisma 2, Manipulation 1, Perception 3, Intelligence 6 (Problem-Solving), Wits 5 (Fast as Electricity)

Abilities: Expression 2, Research 5 (Internet Search), Technology 3, Academics (Mathematics) 6, Enigmas 5 (Number Puzzles), Science (Mathematics) 6

Willpower: 3

Essence: 15

Rage: 3

Gnosis: 5

Merits and Flaws: Thaumivore (5 pt.), Power Source (4 pt.), Paradox Nullification (3 pt.)

Special Advantages: Read and Write (1 pt.)

Node: The Limestone Tree

(Note: this uses the mechanics introduced in **Sources of Magick**. If not using that book in your Chronicle, this is simply a 2-point Node.)

Hidden in plain sight, the Limestone Tree sits in the atrium of the math department that Pratap works in. It is warded through the use of *Inside a Jordan Curve* to prevent it from being detected despite its public location. To most, it appears to be a large sculpture of a tree, done in intricate detail from a single block of limestone. Its nature prevents Sleepers from worrying overmuch about the unusual material of the sculpture. To a mage who has seen through the warding, however, it is clearly alive. The leaves grow off of small twigs that, upon close inspection, form chalk. This chalk is the Tass generated by the Node. It is particularly well-suited to use in the creation of *Hagamoro chalk*.

Systems: This 2-point Node only produces Tass and is the size of a piece of furniture. This results in it producing a massive 7 pawns of Tass per week (two points have gone into Resonance) in the form of those sticks of chalk, letting Pratap be fairly casual about its use.

Resonance: *Precise* 2, *Dusty* 1, *Creative* 1

Relationships

Despite the reputation many mathematicians have as hermits, modern mathematicians, Pratap included, are very much enmeshed into social networks with strong ties to others. They have mentors and students, friends and enemies, and even just casual acquaintances, all within the field of math, before looking into their personal lives.

Mentor: Clint Young

Clint Young taught Pratap everything he needed to get started. Though they aren't even in the same country anymore, the relationship between a thesis adviser and their student stays strong. He and Pratap stay in regular contact. Most of this contact is focused on mundane things, writing papers together,

exchanging teaching techniques, etc. Magickally, Pratap has largely surpassed Clint, though Clint still has more experience dealing with other mages and a larger library.

Clint himself is an almost pathologically laid back man, though this belies his work ethic: you don't become a tenured professor if you lack one. He makes it all look so effortless, though, and like he's never experienced stress in his life. This is all the more remarkable because he's a father, advises an average of one student who graduates every other year, and teaches several courses. The upshot of this is that he's very busy, and can only help Pratap on rare occasions.

Apprentice: Rashmi Joshi

Graduate students are a handful at the best of times. When they're Awakened, though, it's even more dramatic. Rashmi is in her third year, and has completed a masters degree in astrophysics, but decided that she should get her PhD in mathematics. Eventually, she came to Pratap's attention and he took her on as a student. She's a bit more grounded and focused on applications to the physical world than Pratap is, and the two of them are having a lot of trouble coming to an agreement on what her thesis problem should be (and also what project she should complete in order to prove herself finished with her apprenticeship).

Worst of all from Pratap's point of view, she's enjoying the attention she's getting from recruiters for various organizations, both mundane and mystical. She's a very bright student, and though everyone is waiting for her to finish her studies, people who range from the Order of Hermes to the Void Engineers are looking to recruit her, and the flexibility of her Focus (which is even moreso than Pratap's) makes her a prime candidate for any of them.

Rashmi can be frustrating to many. She's a brilliant researcher and she knows it, and it has gone a little bit to her head. But then, few third year math students have published any papers at all, and she's got several. Her competitive streak often gets in the way of her forming close friendships, but she's mostly on good terms with her fellow graduate students, especially the ones interested in working with her on problems.

Aleksei Kozlov

Aleksei is...something else. Most people say that meaning that his personality is strange. He has odd interests and hobbies, even for mathematicians: few truly get that deep into gothic poetry, for instance. When Pratap says it, he means that Aleksei isn't human. Worse, he's some sort of parasite, subsisting on the blood of those who are human.

On the other hand, he's the best damn combinatorist Pratap has ever met.

There's something about counting things that goes beyond talent with Aleksei, beyond even a compulsion. He does it without thinking, instinctively, and can do it in multiple ways, giving clever insights into the relationships between numbers by counting to them differently, knowing they end up in the same place.

Ally: Pratap and Aleksei collaborate well. Pratap is even willing to look the other way on Aleksei's odd eating habits, so long as he keeps it away from anyone that they know, especially Rashmi. Aleksei is a safe haven from the Ascension War for Pratap, a place where he doesn't have to worry about fighting for Reality, and can focus on mathematics.

Enemy: Aleksei is, at his core, a predator. And mathematicians are the people he's closest to, and so the ones he predates on. Pratap is insistent on protecting his friends and especially his apprentice. But Aleksei needs to feed, and will do whatever it takes to ensure that he does so.

Mojisola Kayode

Every so often, a mathematician manages to strike it rich. Before 2008, a few that had gone into finance looked at the state of the market, checked the conditions of their models that said it would keep going up, up, up...and realized those conditions didn't hold. They spotted a weakness in the system and though some raised the alarm, almost no one wanted to listen to them. So they did the only thing they could really do: they shorted subprime loans.

Mojisola Kayode did her best. But when the American economy went off the cliff, she was determined not to go with it, and ended up a multimillionaire, not quite making it to billionaire status. She's fine with that, somehow nine-hundred and ninety-nine million dollars is lower profile than one billion. She's done what several mathematicians who have achieved extreme wealth have done: she's started building institutes. She's funding mathematics in her native Nigeria and also building partner programs in America, still the undisputed center of world mathematics.

Ally: Majisola and Pratap have bonded over how they're treated as mathematicians from the so-called Third World. Now that she's made it big, she can provide him funding through her institutes, and may even be his employer. While she might suggest he work in specific areas, she knows better than to dictate the research preferences of a mathematician.

Enemy: Nothing is worse than having a wealthy patron exercising control over your professional field who doesn't like you. Or even is just uninterested in your field of study. Suddenly, professorships exist for people working on things Pratap has no interest in, taking up the spots that could otherwise have gone to him, these institutes are creating jobs and flooding the market with students interested in Majisola's field, taking grad students away from Pratap. They don't even have to know each other for them to act at cross-purposes in substantial ways as nearly a billion dollars warps the profession.

The Platonic Realm

The Platonic Realm lies in the High Umbra, an Epiphamy that sits behind several others. Both the Epiphamy of Newtonian Mechanics and Einsteinian Relativity and the Continuum Orrery, among others, lie near but below the Platonic Realm. The Realm of Pure Form where Mathematics lies touches on many other pieces of the Umbra as well. One of the easier approaches is through the Digital Web, which is as close to pure mathematics as anything in the Tellurian.

From any Realm that ties to mathematics, or several locations on Earth (one, notably, in Greece) the path to the Platonic Realm always takes the seeker through a cave. In that cave, they will see shadows on the wall, and these shadows will seem to answer their questions. They do have useful information, but it's specific, only to the situation that the seeker finds themself in at the moment, nothing that generalizes or is abstract. An Intelligence + Enigmas roll at difficulty 6 allows the mage to find that answer in the shadows but prevents them from going any further. For those who wish to press on, the temptation for easy answers is difficult. A Willpower roll at difficulty 6 is needed to turn away, and an Intelligence + Enigmas, Academics (Mathematics) or Academics (Philosophy) roll at difficulty 8 will reveal that the shadows are just that: shadows of true knowledge. Success on this roll allows them to look for the source of the shadows and make their way into the Platonic Realm. Once an individual has succeeded at this roll, they never need to again. They have gained the insight and can pass through the cave.

Appearance

The Platonic Realm is an extremely diverse Realm. It has no unified appearance and each of the subrealms from a different branch of mathematics looks fundamentally different. There's a small region near the center, where many people enter, that represents general mathematics, the bits and pieces that don't fit anywhere else or sit at the base that everything else grows out of. New arrivals emerge from a cave recessed into a field, and in the center of the field is an absolutely vast tree. Around the base of the tree there are doors to each of the subrealms.

Away from the doors, the tree holds many blackboards. They are grown into the tree, and the twigs on the lowest hanging branches are sticks of chalk. This central field is where most of the mathematicians who inhabit the Realm spend their time. The sounds of debate and argument about mathematics and related fields fills the area, with the occasional more dramatic interaction, though none of the consequences are permanent, no matter how many times Evariste Galois is shot.

The City of Uncertainty

At first glance, the City of Uncertainty looks just like any other city. In fact, it looks suspiciously like whatever city the viewer feels the most at home at (which causes groups to see different skylines, though things they are close enough to interact with are consistent between them). The view, however,

shifts whenever the characters look away. Over time, it not only shows random cities and random architecture, but multiple at once, with which one they interact with not clear until they actually step inside.

As the characters enter the City, it becomes clear that everything is actually random. The directions of roads needed to get places changes every time, for example. Everything is constantly in Flux. Without the Entropy Sphere, it is nearly impossible (Intelligence + Enigmas difficulty 9) to do even the simplest navigational tasks in the City.

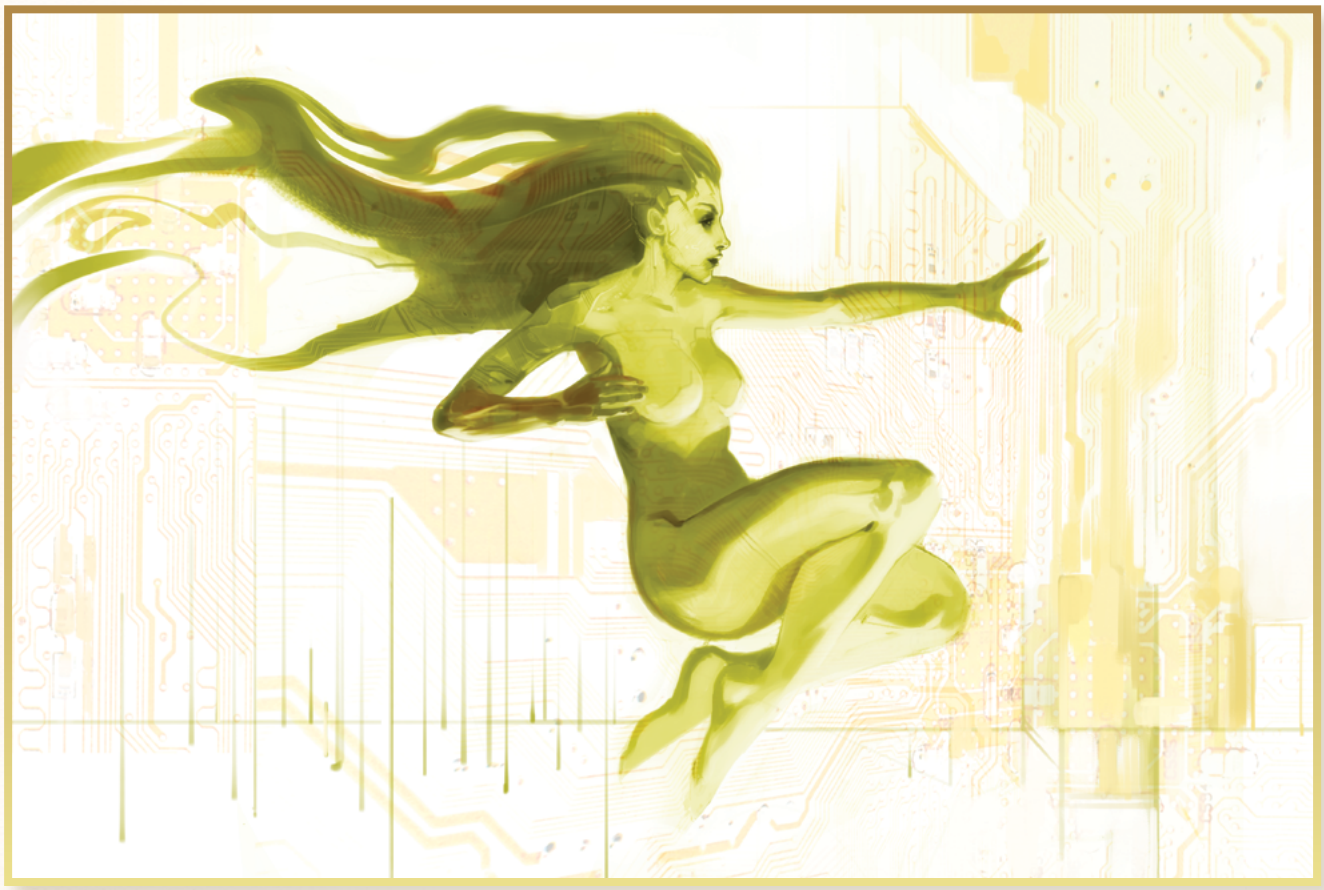
The randomness of the City doesn't just extend to the shape and navigational challenges it causes. Every action, no matter how mundane, has a chance of having a bizarre outcome. If ever there were a time to roll to determine if a character successfully ate their dinner, it is within the City of Uncertainty. Even when simply summarizing a day's events, the character must roll a dice pool relevant to the uncertainties they face, usually Intelligence and some specialty of Academics, Science, Esoterica, or Enigmas. This roll determines, in broad strokes how well they did that day, with botches being catastrophic misreadings of the flow of random events and exceptional successes putting them in a stronger position for the next day. The difficulty on this roll ranges from 3 to 9, determined by the Storyteller rolling ten dice at difficulty 6 and counting successes. If no successes are rolled by the Storyteller, the character automatically succeeds on the day. Fewer than three successes results in a difficulty of 3, and 10 successes in a difficulty of 9.

Characters who spend a full week here, living among the inhabitants and becoming familiar with the nature of the City can buy Enigmas, Science (Mathematics), Science (Quantum Mechanics), and Academics (Mathematics) at half price. Surviving a full week is a difficult task for those who don't already have these Abilities, and few use the City other than to achieved their fifth dot in them. If they stay for a month or longer, the sixth dot of these and any other Ability related to random chance can be learned, albeit at full price. At this point, the Sphere of Entropy can also be bought at half price.

The Digital Borderlands

The most well-known part of the Platonic Realm is the Digital Borderlands. Strangely crisp, as though digitally rendered, the landscape otherwise seems completely normal. There's fields, forests, all sorts of natural things. On closer inspection, none of them look to be natural: fields are perfectly level, trees are fractals, as are clouds, waves on water sources are perfectly sinusoidal, and when the characters do magick, everything pixelates for a moment. The only thing unaffected by all of this is that, in the far distance, clearly beyond not only this Realm but also the next, lies Mount Qaf.

There is, however, a greater structure to the place. Somehow every significant location is marked and has paths to travel to several nearby ones. With a Perception + Enigmas roll (diffi-



culty 8), a character who maps out and studies this pattern will see that it is the same, though rearranged, pattern as nodes and ley lines on Earth. If they achieve 5 or more successes, they may be able to identify a node by connections to other nodes they are aware of. This doesn't give a precise location, just how it connects, so they will still need to find it along the appropriate ley lines.

From here, it is possible to transition to the Digital Web directly. Doing so requires a guide the first time. Fortunately, virtually every denizen of the region is able to do via their connections to logic and discrete mathematics. This guidance won't come for free, however, almost will have some task in the physical world they will insist on in exchange. The spirit of a nonstandard logic may demand that their method of thought be used to solve a problem, whereas a spirit tied to a strange counting problem may require the mage to actually perform their count.

The portions of the Digital Web that it connects to are old, central sectors, which rarely if ever have any security. These sectors often have direct relationships with the mathematics the powers the Digital Web, being designed around various data structures or algorithms, rather than the more immersive sectors that are common in more recent years. In them, binary code can often be accessed directly, and the logic in the sectors is particularly simple, though sometimes strange.

The Farm of Structures

While to those who know little of it, algebra looks wild and untamed, it is actually not only structured but the study of structure itself. Perhaps it is unsurprising that the subrealm for algebra takes the form of a Farm. The Farm of Structures is vast and diverse, monoculture has no place here. The crops grown are incredibly diverse, from trees bearing low-hanging fruit in elementary group and ring theory, to the vast and strangely overlapping Fields of Galois. Individual algebraic objects live in the stables, ready to come out and dine on the theories that influence them, or to be sheared, milked, or slaughtered as necessary for mathematicians to gain insight into them.

Though the whole Realm has a certain structured nature to it, the Farm emphasizes this tendency. Anyone who stays the night on the Farm and who doesn't already have it gains a single dot of Static *Structured* Synergy. On top of that, any mathematically based effect performed here, whether mystical gematria or superscientific Technocratic Procedures, is immediately codified as a rote, giving the appropriate benefits to the caster, even on the first casting.

Though no one has managed to prove a benefit, many also come to the Farm of Structures with the goal of finding the missing piece of some puzzle, enigma, or problem they have been working on. There may or may not be any benefit to specifically doing so, but the Structured nature of the place certainly helps with magickal attempts to put the pieces together, and those who do so often end up with *Solved* Synergy.

Though the runoff from the Farm of Structures nourishes the life in the Infinitesimal River, and the water from the River provides the irrigation for the Farm, the denizens of the two places have an extremely strong rivalry. Those who can live in either tend to choose one as their primary residence, and join that side in the unending conflict between the two. Navigating this is difficult, the lines between the two sides change constantly, and even the most familiar being might be on the other side the next time the mage manages to visit.

The Infinitesimal River

The first time most visitors see the Infinitesimal Rivel they're struck by how strange the name is. Despite sounding like it should be something very tiny, the River is wide and deep, dwarfing even the greatest rivers in physical reality. The main thing distinguishing it from an ocean is that there's a clear direction of flow, not mere currents. The flow is fast, anyone who falls in is carried away at an exceptional pace, and if they're lucky they'll wash up in one of the other Subrealms.

The key thing here is that everything is in motion, and must stay in motion to survive. Staying still is dangerous, attempts to hold still or stay balanced and stop walking, and similar are at a +2 difficulty in the Infinitesimal River. All magicks to hold things down or prevent motion, including such things as halting time, are considered Vulgar With Witnesses even if the mage is completely alone. Meanwhile, any magick that creates or enhances motion is Coincidental and at -1 difficulty.

In addition to being an excellent place to study analytical and dynamical problems (-1 difficulty to all such rolls), the Infinitesimal River can provide an increase to Dexterity or Stamina. Anyone who successfully trains there for at least three weeks, constantly in motion, never holding still at all, not even in sleep, can purchase a sixth dot in either Attribute. Costs for Athletics are halved when training in the Infinitesimal River as well.

For most, the key to doing this is to understand the name of the Subrealm. It is a river of infinitesimals, numbers smaller than any positive number but bigger than zero. A useful tool for studying all the sorts of mathematics relevant to the region, they also provide a valuable clue: motions can be small. As long as there is any motion at all, constantly done by someone conscious that they are deliberately moving at all times, the benefits of the River are possible.

The Kinetic Coast

The Kinetic Coast lies beyond a door marked with images of simple machines and atoms. It's a vast beach, extending seemingly (and perhaps actually) infinitely far in either direction. The beach is multicolored sand mixed with smooth rocks near the entrance, but larger and more jagged ones farther away until the beach eventually becomes virtually impassible. Every time new understanding of mathematical physics is achieved, some of the rocks become smoother or grind down into sand,

extending the accessible part of the beach slightly.

A determined mage can take advantage of this. By finding a rock (Perception + Science difficulty 8) corresponding to a specific problem they are having, they can perhaps find an insight. By trying to break the rock (Strength + Science, with difficulty 6 for the smooth stones up to 9 from the impassible boundaries) they can release an insight that they can take with them when they leave. Other Attributes could be substituted by a clever mage with the appropriate tools. This insight may be publishable in its own right or may allow -1 difficulty on related rolls.

In addition to both direct (through the central tree) and indirect (via areas of mathematical physics using related techniques) connections to the other subrealms of the Platonic Realm, a mage who manages to set sail from the Kinetic Coast can make their way directly to any of the physical science related Realms. Which one they end up in will depend on where they sail from and what their goal is. Getting there requires both an Intelligence + Cosmology roll and an Intelligence + Science roll. If both succeed, the mage and their companions reach their intended destination. If only the Intelligence + Cosmology roll succeeds, they reach an incorrect physical science Realm, and if only the Intelligence + Science roll succeeds, the mage is unable to leave the Platonic Realm through that route, but can safely return to the shore. If both fail, then some potentially malign spirit notices them and makes some sort of contact, preventing them from either going forward or back until it is dealt with.

The Manifold Mountain

The Manifold Mountain cannot be described as a peak, because it lacks one. Somehow it climbs higher and higher, and despite seeming to thin out, never actually becomes smaller. It is a place of pure shape, growing more complex on the ascent. At the bottom are the simple things: spirits representing lines and curves, planes, spheres, Platonic solids, and their higher dimensional analogues. As complexity increases, surfaces appear, as do complex high dimensional objects, irregular shapes, and even moduli spaces: shapes whose points parameterize variations of simpler shapes. The trouble is that no mathematician has ever understood the way the mountain determines complexity, leading to long searches for any specific figure.

Often, the ascent can be aided by the simple shapes near the bottom. Finding an appropriate guide involves a simple Intelligence + Science (Mathematics) roll at difficulty 6, followed by Perception + Investigation at the same difficulty. If the Storyteller judges that the character is not high enough to find direct help, the difficulty of the rolls increases to 8 and the mage can find a spirit that can guide then to a more suitable guide. Once a spirit appropriate to the mage's interest is found, they can answer a mages' questions about shapes like them, both abstract and in more real-world instantiations. They usually have seemingly strange demands for this service. Often, these services will require finding an appropriate being in a different

subrealm and accomplishing a task for them. Though inexperienced mathematicians think this is altruistic, veterans know that geometry benefits from advances in other areas of mathematics, and so these spirits must be getting something out of the deal.

When descending the Mountain, a mage can step off of it into most of the other subRealms of the Platonic Realm. The easiest are the Farm of Structure on one side and the Infinitesimal River on the other. The Mountain also sits next to the Number Fields, which also lie between the Farm and the River. Passing between these Realms through the Mountain is shockingly simple. In fact, some people start in one, take a momentary detour onto the Mountain, and then descend to another, and find that they simply can't go back the way they came. Some spirits, supposedly, have made, and been changed by, this journey.

The Number Fields

The first impression that most travelers have of the Number Fields is that they are serene. And island of calm and quiet in the chaos and bustle of the Platonic Realm. This impression is entirely wrong and dangerous. Similarly, most people think they know what numbers are, and the Number Fields is the perfect place for them to discover just how wrong they are.

The Number Fields are in fact an extremely dangerous place, especially if you're unprepared. Things that you think you know work differently, and there are tons of little things that can trip you up badly. For those used to working with a specific notion of "number," the first pitfall is that each field has a different one. Unless they happen to be in the one that they are thinking of, all of their number based magick and Ability rolls are performed at +2 difficulty. However, a day of study in any given field will permanently remove this difficulty on a successful Intelligence + Science (Mathematics) or Intelligence + Academics (Mathematics) roll at difficulty 6.

The denizens of the Number Fields are the next danger. They tend to consider themselves to be more important than the denizens of other subrealms, and can be quite dangerous if not treated with the respect they believe they deserve. If handled carefully, though, they can be powerful allies. Some believe they actually *are* more powerful than other mathematical spirits, though this is deeply contested by mages who don't favor them. They certainly seem to many to be more fundamental, often representing individual numbers or types of relationships between them, things that are foundational to the entire subject.

The Number Fields contain the concepts of specific numbers, and of numbers as a whole. Elsewhere, you can only interact with two of something. Two apples, two oranges, two pawns of Tass. Here, the number two itself exists, as do all the other numbers people think of. Each field seems to contain a different set of numbers as well. Some travelers have been confused by their search for an element of the Gaussian Integers when they're actually in the Eisenstein field, and vice versa. Whatever sort of numbers they are interested in, though, direct experience teaches better than any abstract reasoning, even if the abstract reasoning is the goal. Once the difficulty penalty has been removed, a traveler who spends a day in a given number field can roll Intelligence + Science (Mathematics) or Intelligence + Academics (Mathematics) at difficulty 8. A success gives them a permanent -1 difficulty on all rolls involving that field. Unfortunately for most mathematicians, the rational numbers are one of the hardest fields to find, and it is impossible without a guide.

Denizens

The beings that live in the Platonic Realm are as diverse as the mathematical concepts that they represent. Exploring a region of the Realm that you've never been to reveals wildly different spirits and other beings living there. Embodiments of mathematical concepts and examples, spirits of great mathematicians, and beings consisting entirely of manifested logic call it home. Moreover, the Platonic Realm has a few beings that travel between it and nearby Realms.

Game statistics for these beings have been omitted as they either fall into the realm of plot device or else form a diverse enough class of beings that their statistics can vary significantly. They also rarely have the Charms common to other spirits and few ever leave the Platonic Realm.

Binary Search Dryad

The Digital Web runs on mathematics more than most places in Reality do. The underlying nature of it consists of 0's and 1's, binary, and runs on computers, literally machines designed to do complex calculations quickly, which turns out to be enough to handle almost anything that anyone wants to do. As a realm of Data, the Digital Web has more information in it than any human being could ever hope to sift through. To handle this overload, computer scientists developed techniques for indexing information to make it faster to access. One of these is the Binary Search Tree.

A Binary Search Tree sorts every piece of information into a hierarchy. In this hierarchy, whatever piece of information you're looking at, the information you want is either "obviously" to the "left" or to the "right." Making binary decision after binary decision, the seeker eventually arrives at the piece of data they're searching for. Better, whenever a new piece of information is added to the Tree, this means that the location it goes in is easy to discover, and the tree can be modified to contain the datum without too much effort.

While these structures underly many information gathering techniques on the Digital Web and in the real world, only on

the Digital Web and the Platonic Realm do they achieve their full potential. The data structure being called a tree is no coincidence: like physical trees, they have "roots" and "branches" and "leaves" and grow over time as more information is added to them. And also like physical trees, they can become home to beings called dryads, or in this case, Binary Search Dryads.

These Dryads are information spirits, and potentially extremely powerful. Their power is determined by how much information they have indexed, and many of them are extremely possessive of their data, keeping it away from other dryads, hoarding it in a way that oddly resembles the dragons that they otherwise do not. They tend to take vaguely feminine forms, but often look more like SHODAN or GLaDOS than like a human being: simulations and circuitry, with tree patterns only vaguely represented in the paths of the wires. They are almost always open to chiminage, though virtually the only thing they will accept is information they have not indexed yet. They also resent when information they have given to someone winds up in the hands of another Binary Search Dryad, and they never forget their grudges.

Monster Group

Terrifying at first sight but comforting and helpful once tamed, the Monster Group lives at the Farm of Structures. Despite it's absolutely massive (but finite! Not something that can be said about everything on the Farm) size, the Monster is simple, looking like a regular farm-cow with several sets of horns once it's understood. On a first encounter, though, lighting and weather will conspire to make it appear sinister and complex, as though it were colored in reds and blacks, could breathe fire, and whatever else the viewer is afraid of. But it turns out to be a gentle giant, at least for those who persist in trying to get to know it.

It is by far the largest of the sporadic finite simple groups, though the spots on it suggest the shapes of most of the others could be contained within it. Oddly, it is looked down on by the majority of finite simple group spirits, because they fit into infinite families, and the Monster is the largest of only 26.

Though befriending the Monster isn't particularly difficult, achieving a true understanding of it is. It takes time (at least three to four visits) and effort (at least 15 successes on Intelligence + Enigmas rolls, difficulty 8, one per visit) to truly begin to grasp it. Once this is accomplished, it will allow itself to be milked once per visit. The "milk" the comes out is actually an extremely high proof alcoholic beverage truly worthy of the name "moonshine" and it grants mathematical visions to the drinker.

Upon drinking the moonshine, the visitor will have a vision that connects two seemingly disparate branches of mathematics. This will usually involve a strange coincidence of numbers that turns out to suggest a more powerful connection than can be immediately put into words. A mathematician working to extract useful information from this vision will never take less than three months to understand the it. After that, once per month they may make a Perception + Science (Mathematics) roll at difficulty 9. If they accumulate 4 or more successes on that roll without botching, then they will see a path to explain the numerical coincidence. If they write it up, it will be considered excellent work by the mathematical community at large, and can be used to purchase a dot of Fame among mathematicians, and potentially other scientists if the insights into their fields might be useful.

The Toposes

Less of a specific being than a class of them, the Toposes are some of the most baffling denizens of the Platonic Realm. They can be found in the Digital Borderlands where each has carved out a territory where they make the rules. These territories only ever grow over time, and seem to relate to how much they've been visited. If pushed, some will suggest that the majority of the Platonic Realm itself is simply the territory of a single Topos that has grown particularly dominant: Set Theory.

Each of them represents an alternate system of logic capable of handling a complex system of mathematics, albeit one that differs from the standard one in either subtle or obvious ways. As such, though they look largely human, each of them will have something about them that is...off. Extra limbs, strange coloration, or being entirely flat are all variations that have been reported. Each is unique, and all of them are rivals, though more similar ones will get along better and have appearances that reflect their similarities.

Visitors find the Toposes are particularly good for helping them solve puzzles. As alternate logics, they are able to produce strange and unexpected solutions to problems, exploiting information that seems disconnected but placing some sort of logical chain between them. They can provide training in Enigmas (even allowing characters to reach the sixth dot of it) as well as the mathematical Abilities of Science and Academics. All they want in exchange is Sleeper attention. The smallest of them especially will give quite a bit to have the visitors return to Earth and write a research paper studying their structures and promoting them as interesting environments in which to do mathematics. Especially if they can do so in a way that makes them look better than Set Theory.

Fermat's Margin

There are some who say that a truly elementary theorem must have an elementary proof. Any proof that really can't be understood by someone who understands the statement must be flawed, and a better one must exist. While these complex proofs are acceptable and help point mathematicians at what's true, they're never truly satisfying. After all, solving a problem from 1637 using ideas that didn't exist until the 1980s, despite the original statement claiming a proof, is extremely unsatisfying. So much so, that the sheer magnitude of how unsatisfying it is has congealed into a being that can be found

in the Number Fields.

Number Theory is particularly overrun with such problems. It's easy to state problems that are nearly impossible to solve: there are no positive integers a, b, c so that $a^n + b^n = c^n$ for n at least 3, or there are infinitely many pairs of prime numbers that only have a single number in between them (like 3 and 5, 5 and 7, 11 and 13, etc., called twin primes). It is also overrun with solutions that don't pan out, or are never properly written down.

Fermat's Margin is never considered to be a good spirit. Some mages relegate it to the role of a Paradox Spirit, one that can make it impossible to write down a good idea before it leaves your mind. It's watchwords and its name come from the margins of Fermat's copy of Diophantus's *Arithmetica*, which includes the phrase "I have discovered a truly marvelous proof of this, which this margin is too narrow to contain." He never wrote down the details elsewhere, and the statement was not shown to be true until 1993, leaving it one of the longest solved open problems, with 356 years between statement and proof. Mages afflicted by Fermat's Margin will often know the truth of things, but be unable to explain it in the time or space that they have, forcing them to follow in Fermat's footsteps, leaving whatever idea they may have had to languish, whether they are right or wrong.

Fermat's Margin, however, has a flip side. It is one of the few true infernal patrons for mathematicians. The first bargain it makes is always the same: trade their reliance on proofs and rigor for the power to apply mathematics more broadly. To just assume that things are true even if they can't prove them, and proceed from there. The pacts grow from there, but it takes a particularly long time to bring a mathematician to outright murder and seems uninterested in the worship that it could gather. Instead, it guides pure mathematicians away from proper rigor and care, causing more errors in their proofs and eventually the complete collapse of their career...unless they make those larger bargains to quickly become more proficient with applied mathematics and to take advantage of this new specialty.

Emmy Noether

A few of the greatest mathematicians from history have been spotted within the Platonic Realm. Those who know of the Realm and have seen them debate whether this is an afterlife for mathematicians or whether they have left such an indelible mark on mathematics that its Realm has to find a way to represent them. Other than the ability to do mathematics, they have no specific powers within the Realm, and otherwise seem to be completely mundane humans. Despite that, they can be invaluable guides, and automatically succeed at any attempt to travel through the Realm, as long as the source and destination at least border on mathematics that they did in life.

One of the most prominent of these mathematicians is

Emmy Noether. Her work revolutionized several disciplines within mathematics, from mathematical physics to commutative algebra and algebraic geometry. It is almost impossible to find areas of math that she didn't touch, and so she can be found anywhere within the Realm. When speaking of mathematics, she is enthusiastic, but demands precision, and can be a harsh critic of bad ideas. However, she nurtures talent, and promotes the works of others, often taking less credit is strictly her due. She also is particularly favorably inclined towards female mathematicians and others coming from outside the traditional halls of mathematical power.

One of the few things that she cannot tolerate is bigotry, especially in mathematics. In life, she was a Jewish woman attempting to work in mathematics in early 20th century Germany, and had to flee the country in 1933. Though she might laugh off a certain amount due to he friendly nature and her focus on the mathematics, anything that distracts from it will result in her expelling the offender from the Platonic Realm, and warning others to help keep them out.

The PDEtrician

A normal equation relates a bunch of quantities, maybe position and velocity, or pressure and volume, or more exotic quantities. A differential equation relates things and their rates of change. A partial differential equation lets them change in more complex ways, especially with time. Virtually everything in the world is governed by partial differential equations (PDEs) and one of the most important applications of analysis is finding and studying their solutions.

Somewhere in the Infinitesimal River, there is an island. Navigating to it is difficult, and requires extremely good approximations of the flows of the currents: partial, approximate solutions to the Navier-Stokes Equations do it. The island itself is completely empty, except for a single spirit. It takes the shape of a human being, a doctor, sitting and waiting for visitors. The details of the PDEtrician vary from visit to visit. Gender, race, height, and weight are never the same twice, and anyone who spends much time on the island will see them slowly change, flowing from one form to another smoothly.

The PDEtrician is capable of manipulating a certain class of PDEs: the ones that describe the human body. Under the right circumstances, they will make changes of almost any sort, though they are most often sought out for the purpose of healing. The more difficult and complex the change being requested, though, the greater the chiminage needed. And the PDEtrician only accepts one form of chiminage: solutions to PDEs. For small things, like healing Bashing damage, solutions to simple equations suffice (Intelligence + Academics (Mathematics) or Intelligence + Science (Mathematics) at difficulty 4). For larger changes, including healing Lethal and Aggravated damage or temporarily increasing Attributes, even shapeshifting, more complex equations must be solved (difficulty 6 through 9, as a rule of thumb, difficulty should be roughly 4 + highest Sphere to reproduce the request).

In the case of truly difficult open problems, the PDEtrician can go beyond the limits of normal magicks. Legend has it that solving the most famous unsolved PDE at any given time will grant it the power to raise the dead for the solver. In the modern world, this would consist of finding a proper, exact solution to the Navier-Stokes Equations. Of course, if someone solved that, the rewards go beyond what the PDEtrician can provide.

The Navier-Stokes Equations

Though largely unknown to people outside of mathematics, physics, engineering, and related disciplines, the Navier-Stokes equations are one of the most important sets of differential equations in the world. They describe the flow of fluids, making them essential to everything from weather prediction to pollution cleanup. Though they can be used to make effective predictions about these things, they are infamously difficult to work with mathematically. In fact, despite it being physically obvious that fluids don't reach infinite speeds or masses through the normal processes that the Navier-Stokes Equations describe, no one seems to be able to prove that there are any solutions to them that don't go to infinity at some finite time. If this could be shown and the solutions constructed, then all of the things that are modeled would improve substantially, and who doesn't want more accurate weather prediction? The Navier-Stokes Equations are so intractable that the Clay Mathematics Institute has placed a one million dollar bounty on them: anyone who can prove such solutions exist will win the prize.

20th Anniversary Edition

MAGE
The Ascension

Name: Pratap Miraj
Player:
Chronicle:

Nature: Idealist
Demeanor: Pedagogue
Essence: Pattern

Affiliation:
Sect:
Concept:

Attributes

Physical

Strength	●●○○○
Dexterity	●●○○○
Stamina	●●○○○

Social

Charisma	●●●○○
Manipulation	●●○○○
Appearance	●●○○○

Mental

Perception	●●●○○
Intelligence	●●●●○
Wits	●●●●○

Abilities

Talents

Alertness	●○○○○
Art	○○○○○
Athletics	○○○○○
Awareness	●●○○○
Brawl	○○○○○
Empathy	●○○○○
Expression	●○○○○
Intimidation	○○○○○
Leadership	○○○○○
Streetwise	○○○○○
Subterfuge	○○○○○

Skills

Crafts	○○○○○
Drive	●○○○○
Etiquette	●○○○○
Firearms	○○○○○
Martial Arts	○○○○○
Meditation	●○○○○
Melee	○○○○○
Research	●●●○○
Stealth	○○○○○
Survival	○○○○○
Technology	●●○○○

Knowledges

Academics Math	●●●●○
Computer	●○○○○
Cosmology	○○○○○
Enigmas	●●●●○
Esoterica Esoteric Math	●●○○○
Investigation	○○○○○
Law	○○○○○
Medicine	○○○○○
Occult	●○○○○
Politics	○○○○○
Science Math	●●●●○

Spheres

Correspondence	●●●○○
Entropy	●●○○○
Forces	○○○○○
Life	○○○○○
Matter	●●○○○
Mind	●●●●○
Prime	●●○○○
Spirit	○○○○○
Time	●●○○○

Advantages

Backgrounds

Avatar	●●●○○
Sanctum	●○○○○
Node	●●○○○
Mentor	●○○○○
Contacts	●●○○○
Allies	●●○○○

Arete

●●●●○○○○○○

Willpower

●●●●●○○○○○
□□□□□□□□□□

Health

Bruised	-0	☐
Hurt	-1	☐
Injured	-1	☐
Wounded	-2	☐
Mauled	-2	☐
Crippled	-5	☐
Incapacitated		☐

Other Traits

	○○○○○
	○○○○○
	○○○○○
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	○○○○○
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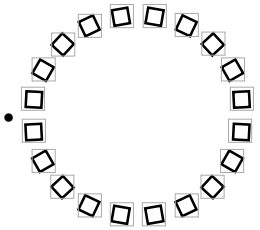
	○○○○○

Quintessence



Paradox

Experience

20th ANNIVERSARY EDITION

MAGE THE ASCENSION

Other Traits

	OOOOO
	OOOOO
	OOOOO
	OOOOO
	OOOOO
	OOOOO
	OOOOO
	OOOOO
	OOOOO

Rotes

Banach-Taski (Matter 2, Prime 2)
Chaotic Systems (Time 2)
Explore the Platonic Realm (Mind 4, Corr 3)
Inside a Jordan Curve (Corr 2)
Beyond Rademacher (Matter 2)
Cram Session (Mind 1)
Universal LAnguage (Mind 3)

Focus

Axiom of Choice
Chalk
Figures and Knots
Flow State
Formulas and Equations
Numbers and Numerology
Proof Assistants

Wonders

Name:
Description:

Name:
Description:

Name:
Description:

Merits & Flaws

Merit	Cost	Flaw	Bonus
		Apprentice	

History

Goals/Destiny

Short-Term: Keep Rashmi out of trouble and help her finish her Thesis
Long-Term: Expand his clique of mathematical mages into a fully indpendent Craft or Subfaction

Description

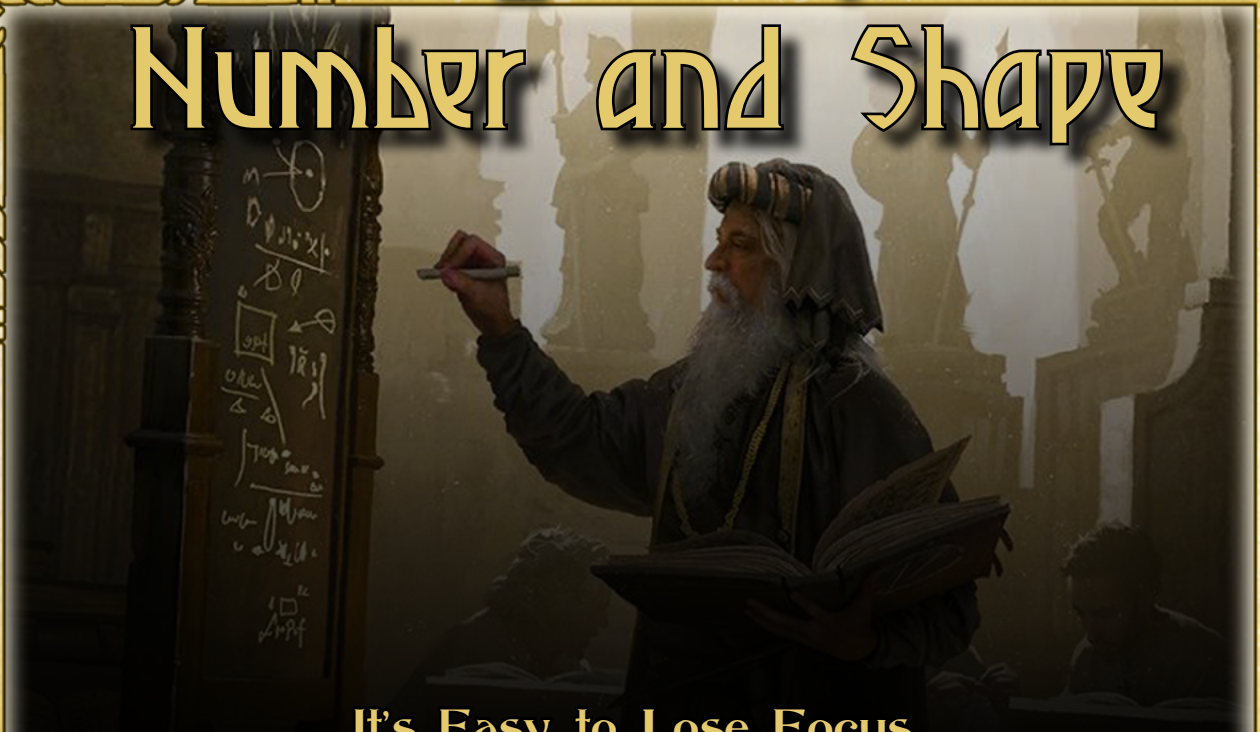
Age:
Apparent Age:
Sex:
Ethnicity:
Hair:
Eyes:
Height:
Weight:

Gear & Equipment

Combat

Weapon/Attack	Diff.	Damage	Range	Rate	Clip

Paradigm Explored
Number and Shape



It's Easy to Lose Focus

M20 defined Focus as Paradigm, Practice, and Instruments, but the lines between them can be fuzzy. It's not always clear what the Focus of a character should be, or what magick within it looks like. This can be made even worse by how esoteric many characters can get. It's fairly easy in many ways to have a weird magick engineer building bizarre things, but what happens when you try it with something more abstract, like mathematics?

It Helps to Have a Bit of Rigor

Paradigm Explored: Number and Shape provides:

- An NPC who can be dropped into many Mage games
- A detailed breakdown of Paradigm, Practice, and Instruments for a mathematical mage
- 11 rotes
- 3 wonders
- A new Node
- A fully detailed Astral Realm for PCs to explore

WHITE WOLF

20th ANNIVERSARY EDITION
MAGE
THE ASCENSION